# INSTRUCTION MANUAL

SERIES

# 1250

UNIVERSAL SWITCH CONTROLLER

# RACAL-DANA

RACAL

*The Electronics Group*

VOLUME 1 OF 2
PUBLICATION NO. 980609

SERIES

# 1250

## UNIVERSAL SWITCH CONTROLLER

**RACAL-DANA**


**RACAL-DANA INSTRUMENTS INC.**
4 Goodyear Street, P.O. Box C-19541, Irvine, CA 92713
Telephone: 714/859-8999, FAX: (714)859-2505

**RACAL-DANA INSTRUMENTS LTD.**
Hardley Industrial Estate, Hythe, Southampton, Hampshire SO4 6ZH, England
Telephone: (0703) 843265, FAX: (0703) 848919, TLX: 47600

**RACAL-DANA INSTRUMENTS S.A.**
18 Avenue Dutartre, 78150 Le Chesnay, France
Telephone: 3-955-8888, TLX: 697215

**RACAL-DANA INSTRUMENTS GmbH**
Frankenforster Strasse 21, 5060 Bergisch Gladback 1, Federal Republic of Germany
Telephone: 2204 60081, TLX: 887 8428

**RACAL-DANA INSTRUMENTS ITALIA srl.**
Via Mecenate 84/A, 20138 Milano, MI, Italy
Telephone: (02) 5062767/5052686/503444, TLX: 315697


RACAL


PUBLICATION DATE: NOVEMBER 1989



©Copyright 1989 by Racal-Dana Instruments, Inc. Printed in the United States of America. All rights reserved.
This book or parts thereof may not be reproduced in any form without written permission of the publishers.

# WARRANTY

Within one year of purchase, Racal-Dana will repair or replace your instrument, at our option, if in any way it is defective in material or workmanship. The instrument must be returned to the country of purchase, unless prior arrangement has been made, and Racal-Dana Instruments will pay all parts and labor charges. Just call Racal-Dana Customer Service at (714) 859-8999 in U.S.A., (0703) 843265 in England, (1) 3-955-8888 in France, 06102-2861/2 in Germany or (02) 5062767, 5052686, or 503444 in Italy for assistance. We will advise you of the proper shipping address for your prepaid shipment. Your instrument will be returned to you freight prepaid.

# PROPRIETARY NOTICE

This document and the technical data herein disclosed, are proprietary to Racal-Dana Instruments, Inc., and shall not, without express written permission of Racal-Dana Instruments, Inc., be used, in whole or in part to solicit quotations from a competitive source or used for manufacture by anyone other than Racal-Dana Instruments, Inc. The information herein has been developed at private expense, and may only be used for operation and maintenance reference purposes or for purposes of engineering evaluation and incorporation into technical specifications and other documents which specify procurement of products from Racal-Dana Instruments, Inc.

# FOR YOUR SAFETY

Before undertaking any maintenance procedure, whether it be a specific troubleshooting or maintenance procedure described herein or an exploratory procedure aimed at determining whether there has been a malfunction, read the applicable section of this manual and note carefully the **WARNING** and **CAUTION** notices contained therein.

The equipment described in this manual contains voltage hazardous to human life and safety and which is capable of inflicting personal injury. The cautionary and warning notes are included in this manual to alert operator and maintenance personnel to the electrical hazards and thus prevent personal injury and damage to equipment.

If this instrument is to be powered from the AC line (mains) through an autotransformer (such as a Variac or equivalent) ensure that the common connector is connected to the neutral (earthed pole) of the power supply.

Before operating the unit ensure that the protective conductor (green wire) is connected to the ground (earth) protective conductor of the power outlet. Do not defeat the protective feature of the third protective conductor in the power cord by using a two conductor extension cord or a three-prong/two-prong adaptor.

Maintenance and calibration procedures contained in this manual sometimes call for operation of the unit with power applied and protective covers removed. Read the procedures carefully and heed Warnings to avoid "live" circuit points to ensure your personal safety.

Before operating this instrument:

1. Ensure that the instrument is configured to operate on the voltage available at the power source. See Installation Section.

2. Ensure that the proper fuse is in place in the instrument for the power source on which the instrument is to be operated.

3. Ensure that all other devices connected to or in proximity to this instrument are properly grounded or connected to the protective third-wire earth ground.

If at any time the instrument:

- Fails to operate satisfactorily
- Shows visible damage
- Has been stored under unfavorable conditions
- Has sustained stress

It should not be used until its performance has been checked by qualified personnel.

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_09941

AMENDMENT TO
1250/1251 INSTRUCTION MANUALS
February 5, 1990

## Option 1250-15A

### Description

The 1250-15A Relay Driver Module is designed for applications where it is necessary to locate relays externally. Each module provides 24 current sink output drivers and 24 sense inputs. Sense feedback circuitry supports confidence testing for these external relays. An internal +13V supply is available as a source for relay coil currents. External supplies up to +30V may also be used.

**Specifications**

| | |
|---|---|
| Switch Configuration: | 24 output drivers (sinking)<br>24 Sense inputs |
| User Connector: | 3 DB25 connectors. Each connector carries 8 output drivers, 8 sense inputs, supply voltage and corresponding return line. |

Maximum Voltage at Output Driver

| | |
|---|---|
| Off: | 30 V |
| On: | 1.6 V |

Maximum Current at 100 % duty cycle:

| | |
|---|---|
| Per Driver: | 350 mA |

Per Group:

| | |
|---|---|
| CH00 - 07 | 1.0 A |
| CH08 - 15 | 1.0 A |
| CH16 - 23 | 1.0 A |

| | |
|---|---|
| Per Module: | 3.0 A with external supply |
| Number of Channels: | 24 |
| Sense Input impedance: | 6.8 kΩ |

Sense Input Voltages:

| | |
|---|---|
| Relay de-energized | 9 - 30 V |
| Relay energized | 0 - 1.6 V |

| | |
|---|---|
| Internal Supply: | +12.6 V at 1.7 A, fused at 2 A |
| Maximum driver switching time: | 1.0 μs / driver |

**1250-15A Relay Driver Module Specific Syntax**

The 1250-15A Relay Driver Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

The module specific syntax for the 1250-15A is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>]

where <slotnumber> is the 1251 chassis slot that the 1250-15A resides in, value 1 - 14.

<channel> is the reference of a channel that is to be used to actuate a relay external to the 1250-15A. The range of values for <channel> is 0 - 23

The module specific syntax used for the CLOSE command is the same as for the OPEN command.

The SETUP command controls the sequence mode of the 1250-15A. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1251 chassis slot that the 1250 Series module resides in, value 1 - 14.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1251 chassis slot that the 1250 Series module resides in, value 1 - 14.

The responses to the PSETUP command for the 1250-15A is as follows:

<slotnumber>.1250-15A RELAY DRIVER MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1251 chassis slot that the 1250 Series module resides in, value 1 - 14.

The responses to the PDATAOUT command for the 1250-15A is as follows:

<slotnumber>.1250-15A RELAY DRIVER MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 23 for the 1250-15A.

### 1250-15A Confidence Mode Support

The 1250-15A may be configured to support confidence testing in one or more ways, depending on the types of relays that the card is driving and the users requirements. Three types of confidence testing are available, no relay sensing, coil current sensing and spare contact sensing. The spare contact sensing is available only if the relay is a DPDT type with one of the pair of contacts unused and the exact configuration depends on whether the relay is normally open or normally closed. More than one type of confidence test may be implemented on a single board and Racal-Dana recommends that channels 0 - 7, 8 - 15 and 16 - 23 have one type of confidence feedback per group implemented.

The 1250-15A is factory configured with DIP switches SW1 to SW6. The position of these switches determines the type of confidence testing to be used.

**NOTE**

The 1250-15A is shipped with all switches in the ON position, allowing all channels to pass the Confidence mode test without external connections. If external relays are connected, the DIP switches must be set to allow the type of confidence mode testing desired and external coil or contact feedback supplied.

Each of the 24 channels of the 1250-15A may be configured to use any of the three confidence test modes available. Two switches must be set per channel to set the confidence mode for that channel.

The DIP switches that correspond to the particular channel groups are as follows:

| | |
|---|---|
| Group 1 (Channels 0 -7) | SW1 and SW2 |
| Group 2 (Channels 8 -15) | SW3 and SW4 |
| Group 3 (Channels 16 - 23) | SW5 and SW6 |

The switches contained in the switch blocks that are associated with a particular channel are as follows:

| | |
|---|---|
| SW1 and SW2, switches 1 to 8, respectively, | Channels 0 to 7, respectively |
| SW3 and SW4, switches 1 to 8, respectively | Channels 8 to 15, respectively |
| SW5 and SW6, switches 1 to 8, respectively | Channels 16 to 23, respectively |

**NOTE**

The switch numbers and the ON position for each switch block are marked on the switch block body rather than silk screened on to the PCB itself.

The switch settings for the confidence modes available for each channel are as follows:

| Confidence mode | Switch SW1 | Switch SW2 |
|---|---|---|
| FORM B | OFF (open) | OFF (open) |
| FORM A | OFF (open) | ON (closed) |
| Coil current | ON (closed) | OFF (open) |
| No relay | ON (closed) | ON (closed) |

**NOTE**

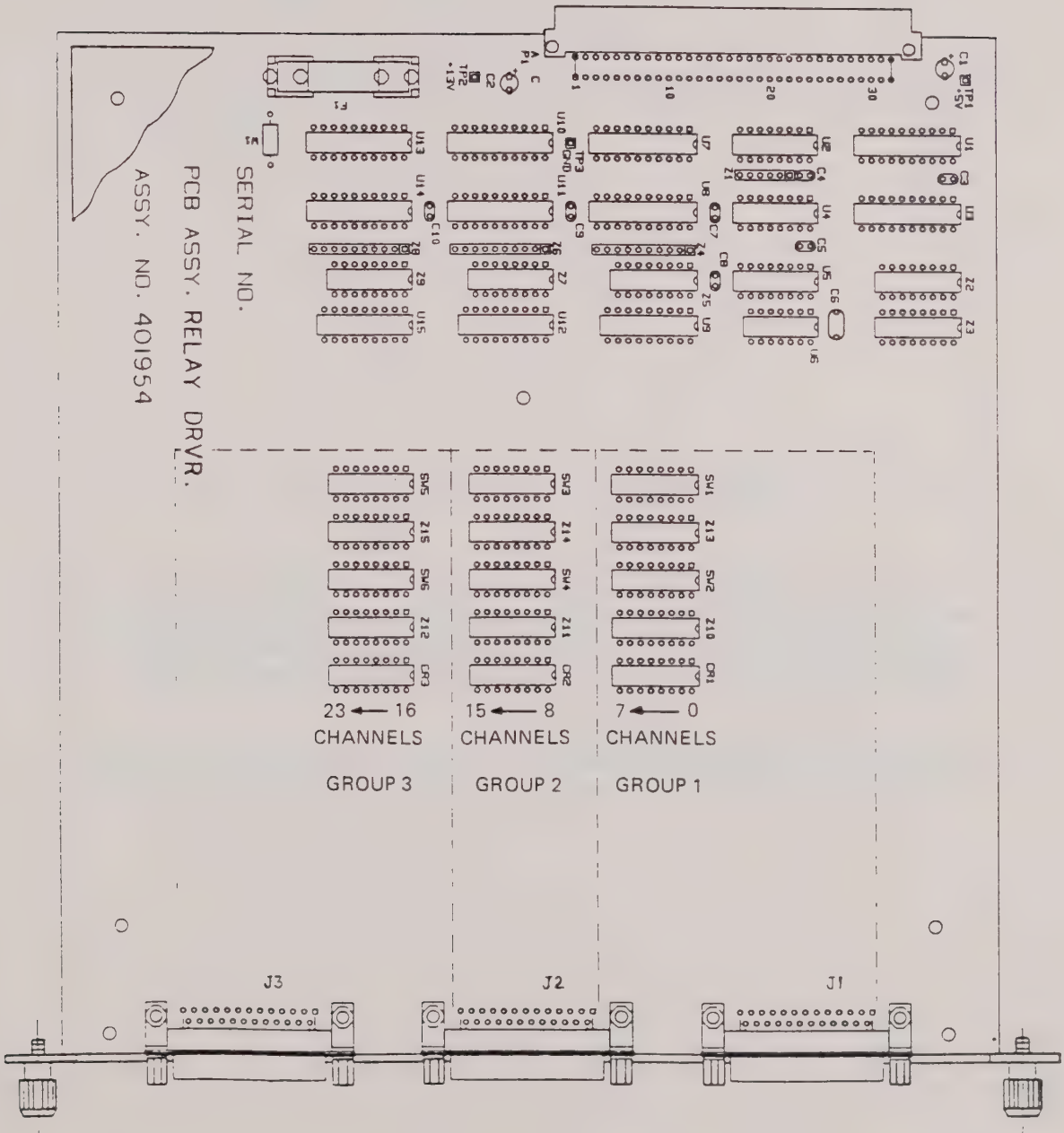
All unused channels must be set to the No Relay mode when the Confidence mode is enabled for the 1250-15A to pass the Confidence test.

Refer to Table 1 for the 1250-15A DB25 pins that correspond to pins S and D for each channel and to Figure 1 for the locations of switches SW1 through SW6.

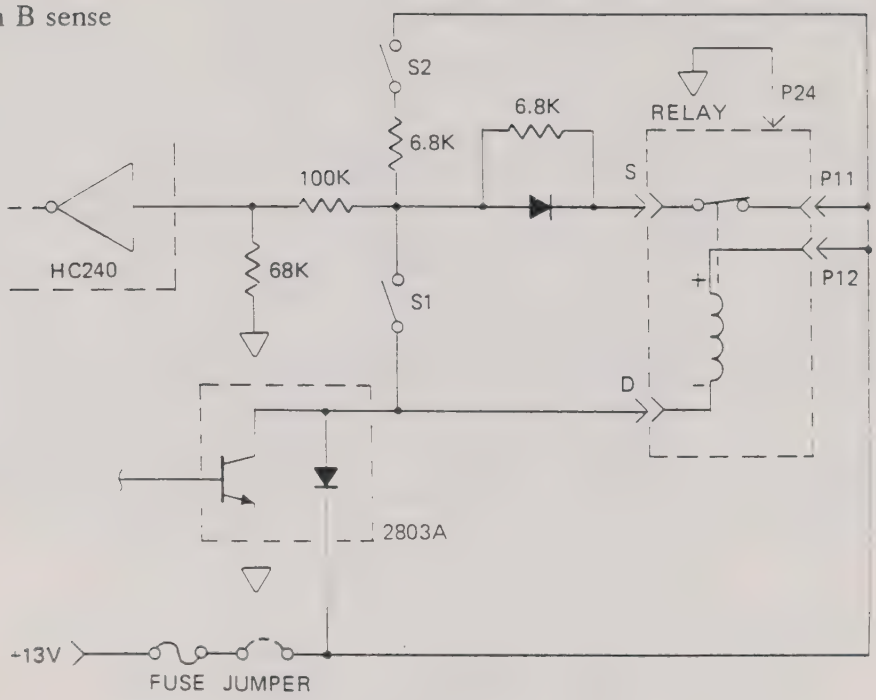
**Table 1, 1250-15A Pins D and S**

| Channel | Pin D | Pin S |
|---|---|---|
| 00 | J1-1 | J1-7 |
| 01 | J1-14 | J1-20 |
| 02 | J1-2 | J1-8 |
| 03 | J1-15 | J1-21 |
| 04 | J1-3 | J1-9 |
| 05 | J1-16 | J1-22 |
| 06 | J1-4 | J1-10 |
| 07 | J1-17 | J1-23 |
| 08 | J2-1 | J2-7 |
| 09 | J2-14 | J2-20 |
| 10 | J2-2 | J2-8 |
| 11 | J2-15 | J2-21 |
| 12 | J2-3 | J2-9 |
| 13 | J2-16 | J2-22 |
| 14 | J2-4 | J2-10 |
| 15 | J2-17 | J2-23 |
| 16 | J3-1 | J3-7 |
| 17 | J3-14 | J3-20 |
| 18 | J3-2 | J3-8 |
| 19 | J3-15 | J3-21 |
| 20 | J3-3 | J3-9 |
| 21 | J3-16 | J3-22 |
| 22 | J3-4 | J3-10 |
| 23 | J3-17 | J3-23 |

Figure 1, 1250-15A Switch locations



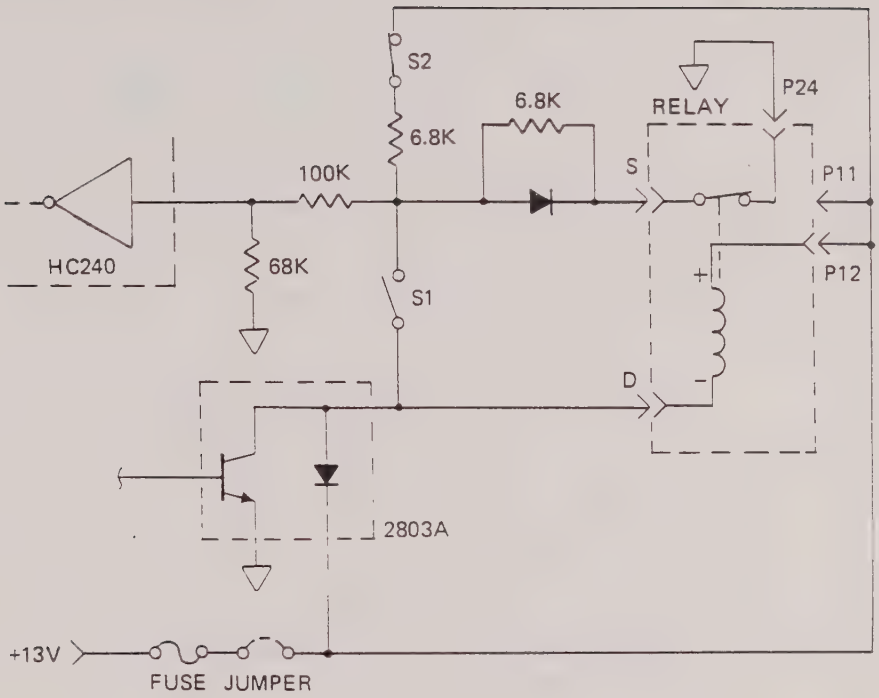
Form B sense




To implement FORM B (normally closed) sensing, set both switches that correspond to the channel to be monitored to the OFF position. For a polarized relay coil, connect the positive side to pin 12 of the corresponding DB25 connector and the negative side of the coil to pin D. Connect the spare contacts of the relay to pin 11 and pin S. There is no connection to pin 24.

Refer to Table 1 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

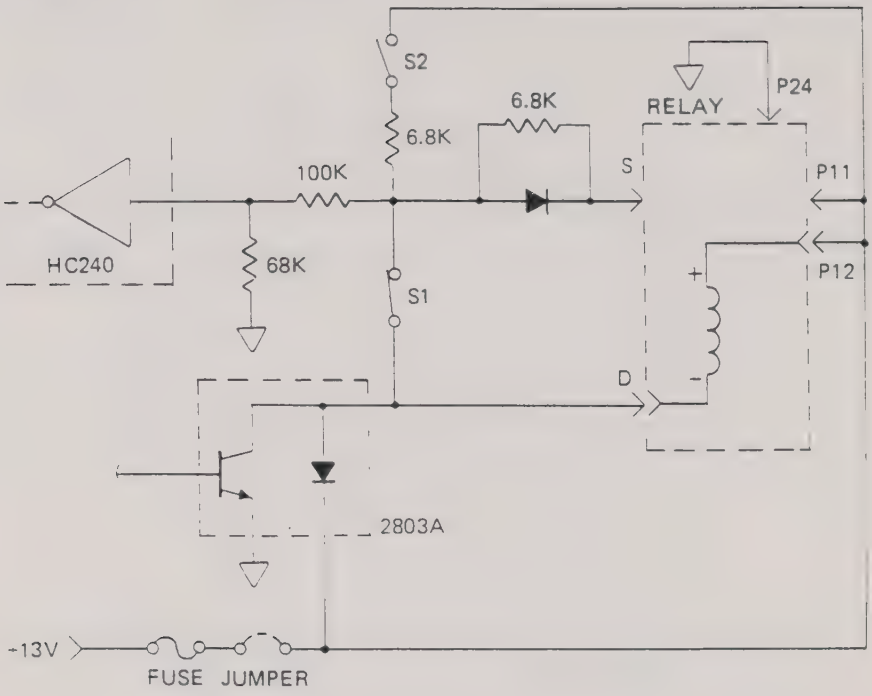
Form A sense




To implement FORM A (normally open) sensing, set switch 1 for that channel to OFF and switch 2 to ON. For a polarized relay coil, connect the positive side to pin 12 of the corresponding DB25 connector and the negative side of the coil to pin D. Connect the spare contacts of the relay to pin 24 and pin S. There is no connection to pin 11.

Refer to Table 1 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

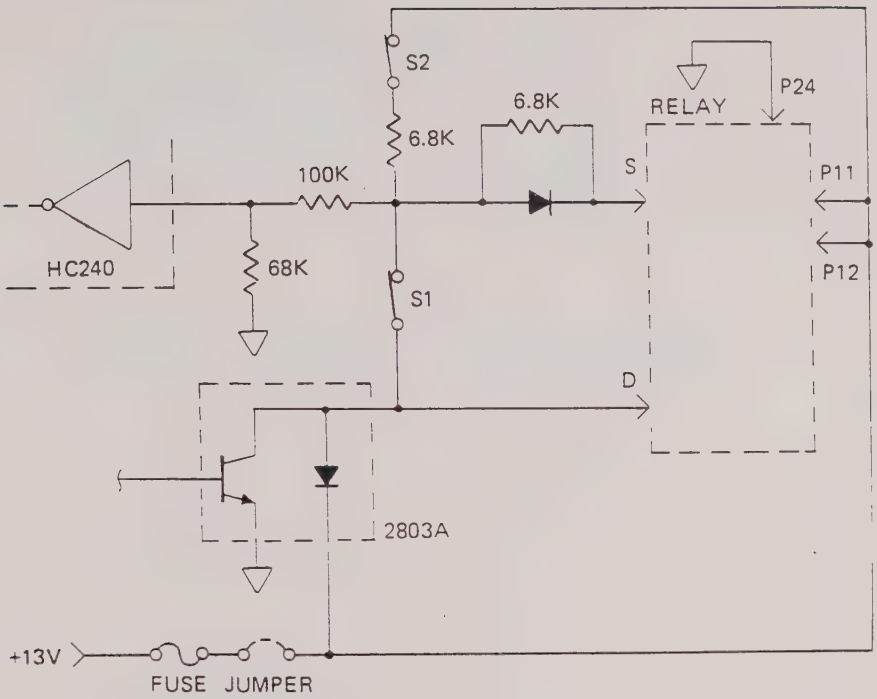
Coil Current Sense




To implement Coil current sensing, set switch 1 for that channel to ON and switch 2 to OFF. For a polarized relay coil, connect the positive side to pin 12 of the corresponding DB25 connector and the negative side of the coil to pin D. There are no connections to pin 11, pin 24 and pin S.

Refer to Table 1 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

No Relay Sense




To implement No Relay sensing, set switch 1 for that channel to ON and switch 2 to ON. There are no connections to pin 11, pin 12, pin 24 pin S and pin D. This is the default mode for the 1250-15A, and it allows any channel to pass the confidence test with no external connections. All channels not used must be set to this mode to avoid interference with the active channels when the 1250-15A fails the confidence test.

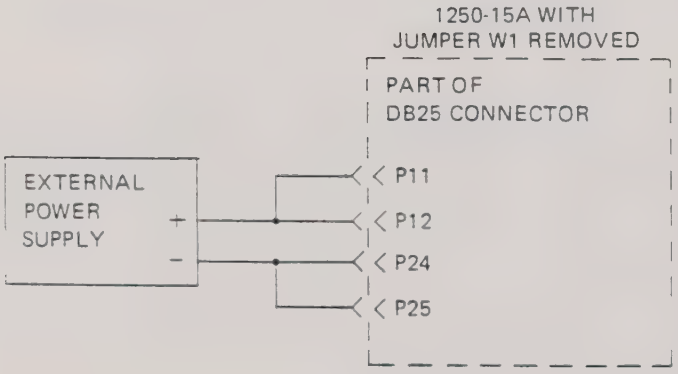
Refer to Table 1 for the 1250-15A DB25 connector pin numbers that correspond to pins D and S in the above diagram.

### Internal and External Power Supply Configuration

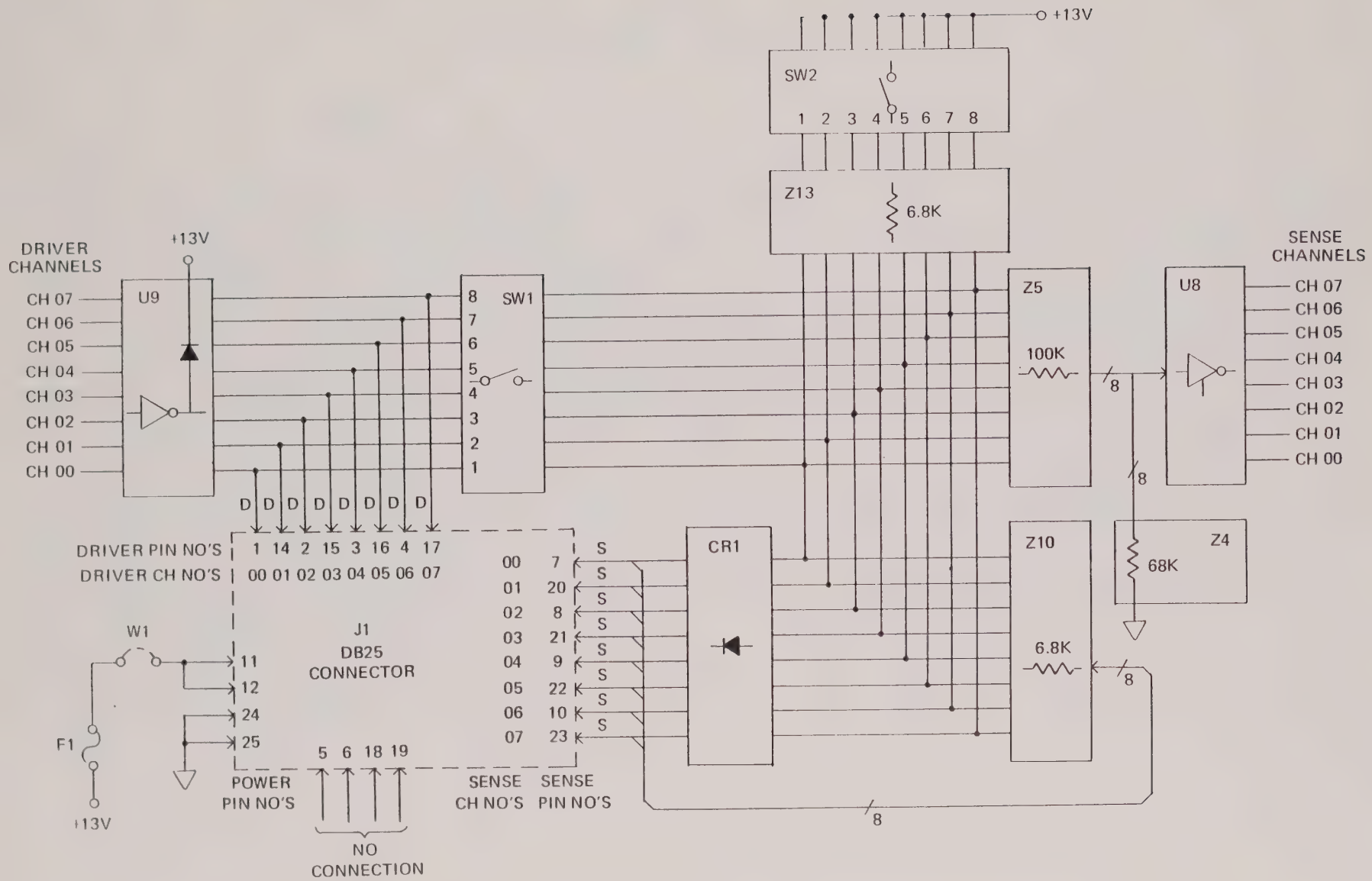
The 1250-15A is shipped with jumper W1 installed. This allows the relays on the 1250-15A to draw power from the 1251 internal +13 V power supply. If an external power supply is to be used, remove jumper W1 and supply the external power to the 1250-15A through the DB25 connectors as shown below. An external supply may be required when the relays used require a different coil voltage or when the coil currents required are greater than the rated current for the board. Refer to the 1250-15A Specifications for further details.

NOTE

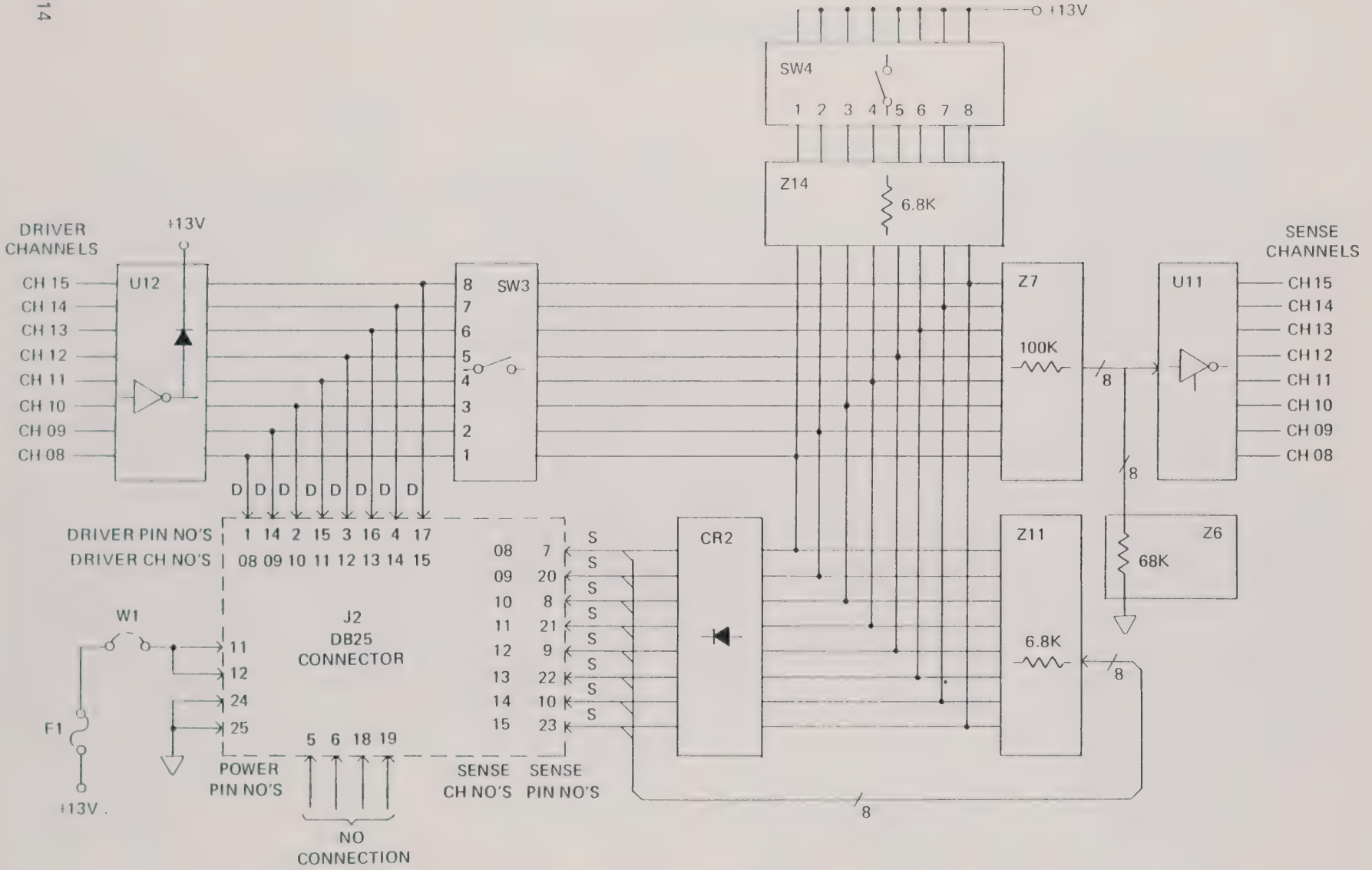
Only one external power supply can be used on a single board



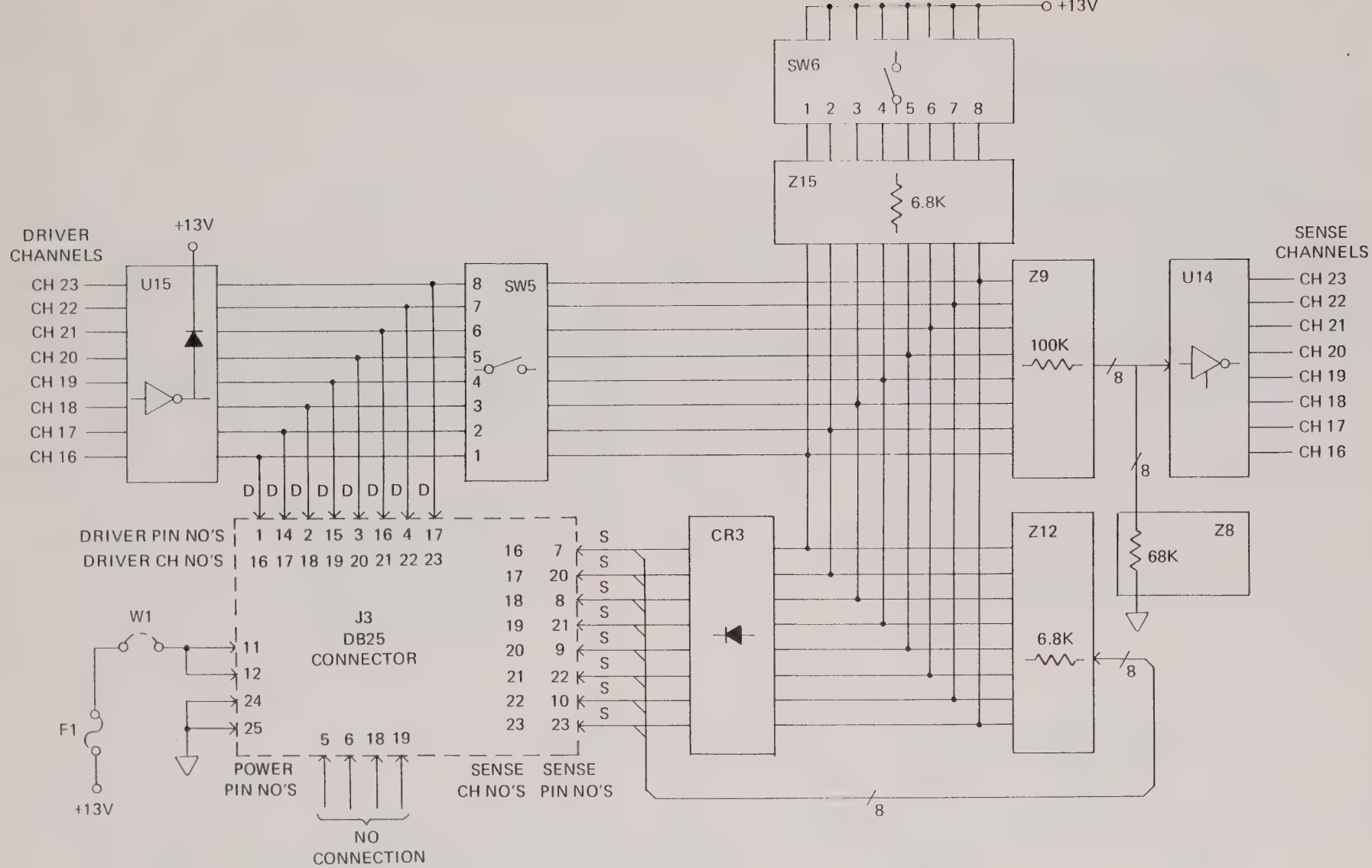

To use an external supply, connect the positive terminal of the supply to pins 11 and 12 of the DB25 connector and the negative terminal to pins 24 and 25.



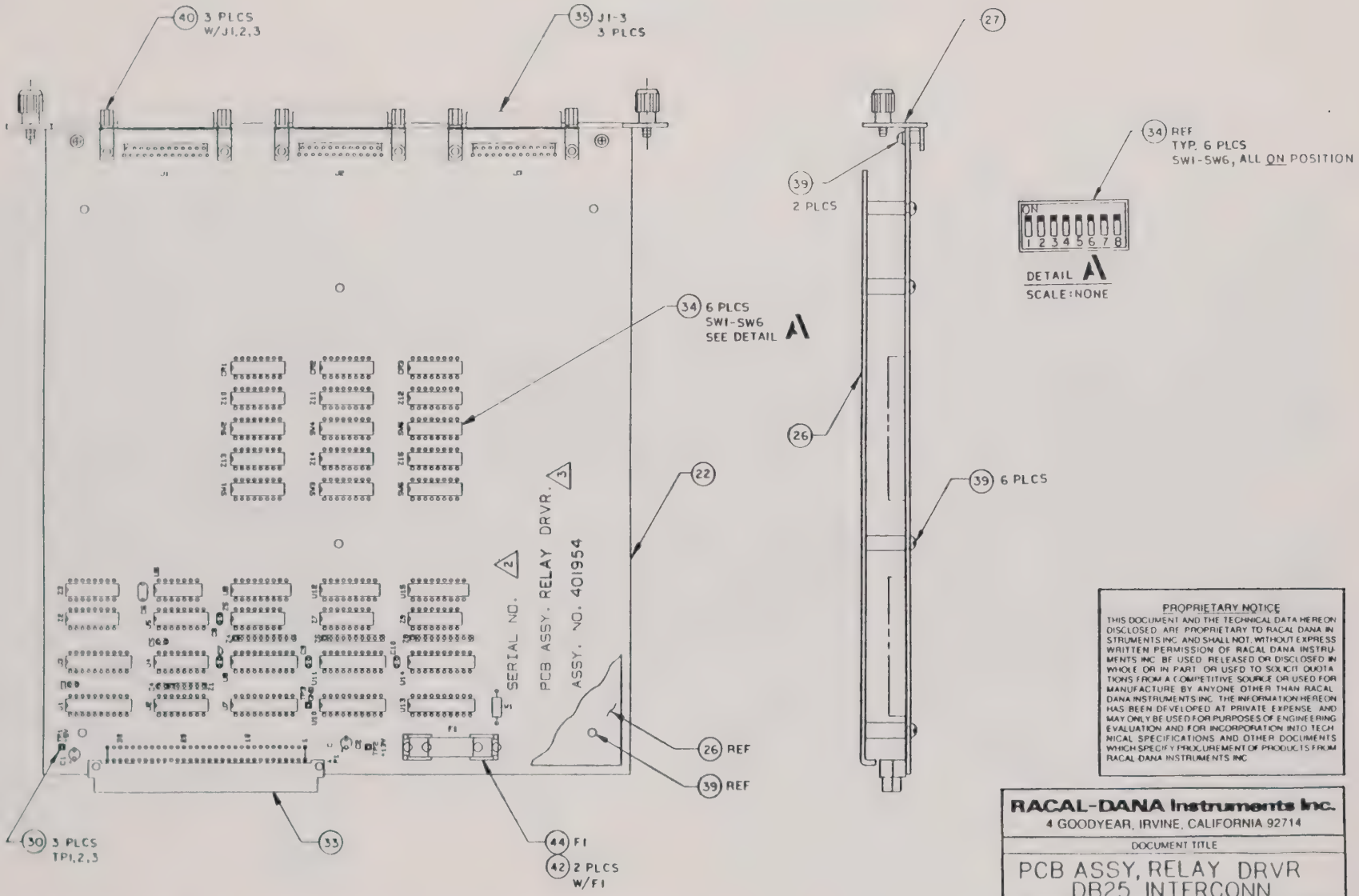

1250-15A Relay Driver Connection Diagram
Group 1




1250-15A Relay Driver Connection Diagram
Group 2




1250-15A Relay Driver Connection Diagram
Group 3




3 INK STAMP ASSEMBLY NAME & NUMBER APPROX WHERE SHOWN ON CIRCUIT SIDE.

2 INK STAMP SERIAL NUMBER ON CIRCUIT SIDE IN INDICATED AREA.

1. REFERENCE SCHEMATIC 431954.

NOTES: UNLESS OTHERWISE SPECIFIED

PROPRIETARY NOTICE

THIS DOCUMENT AND THE TECHNICAL DATA HEREON DISCLOSED ARE PROPRIETARY TO RACAL DANA INSTRUMENTS INC AND SHALL NOT, WITHOUT EXPRESS WRITTEN PERMISSION OF RACAL DANA INSTRUMENTS INC BE USED, RELEASED OR DISCLOSED IN WHOLE OR IN PART OR USED TO SOLICIT QUOTATIONS FROM A COMPETITIVE SOURCE OR USED FOR MANUFACTURE BY ANYONE OTHER THAN RACAL DANA INSTRUMENTS INC. THE INFORMATION HEREON HAS BEEN DEVELOPED AT PRIVATE EXPENSE AND MAY ONLY BE USED FOR PURPOSES OF ENGINEERING EVALUATION AND FOR INCORPORATION INTO TECHNICAL SPECIFICATIONS AND OTHER DOCUMENTS WHICH SPECIFY PROCUREMENT OF PRODUCTS FROM RACAL DANA INSTRUMENTS INC

RACAL-DANA Instruments Inc.
4 GOODYEAR, IRVINE, CALIFORNIA 92714

DOCUMENT TITLE
PCB ASSY, RELAY DRVR
DB25 INTERCONN

| SIZE | CODE IDENT NO | DOCUMENT NO | REV |
|---|---|---|---|
| D | 21793 | 401954 | A |

SCALE — SHEET 1 OF 2

401954 PCB ASSY., RELAY DRVR, DB25 INTERCONN

| REF DESIG | RACAL-DANA P/N | DESCRIPTION | FSC | MANUFACTURER'S P/N |
|---|---|---|---|---|
| C1 | 110126 | CAP, TANTA, 6.8UF, 35V, 20 PERCENT | 05397 | T355F685M035A5 |
| C2 | 110126 | CAP, TANTA, 6.8UF, 35V, 20 PERCENT | 05397 | T355F685M035A5 |
| C3 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| C4 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| C5 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| C6 | 100120 | CAP, CERAM, 270 PF 1000V, 20 PERCENT | 56289 | C023B102E271M |
| C7 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| C8 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| C9 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| C10 | 100062 | CAP, CERAM, .01 UF 100V, 10 PERCENT | 05397 | C320C103K1R5CA |
| CR1 | 231294 | DIODE ARRAY, 16P DIP, 8 IND. DIODES | 56289 | TND908 |
| CR2 | 231294 | DIODE ARRAY, 16P DIP, 8 IND. DIODES | 56289 | TND908 |
| CR3 | 231294 | DIODE ARRAY, 16P DIP, 8 IND. DIODES | 56289 | TND908 |
| F1 | 920488 | FUSE, 2A, 250V | 75915 | 312.002 |
| J1-J3 | 601726 | CONNECTOR, D-SUB, RECEPT., 25-PIN | 00779 | 745783-4 |
| P1 | 601227 | CONNECTOR, PCB, 64-PIN, SOCKET PLUG | 00779 | 531796-2 |
| SW1-SW6 | 601699 | SWITCH, DIP, 8 POS, LOW PROFILE | 71450 | 207-8-LPST |
| TP1 | 600786 | POST, TERMINAL, MACHINE APPLIED STRIP | 00779 | 1-87022-0 |
| TP2 | 600786 | POST, TERMINAL, MACHINE APPLIED STRIP | 00779 | 1-87022-0 |
| TP3 | 600786 | POST, TERMINAL, MACHINE APPLIED STRIP | 00779 | 1-87022-0 |
| U1 | 230577 | IC, OCTAL BUFFER | 27014 | 74LS244 |
| U2 | 230368 | IC, DEMULTIPLEXER | 27014 | SN74LS138N3 |
| U3 | 230577 | IC, OCTAL BUFFER | 27014 | 74LS244 |
| U4 | 230766 | IC, INTERFACE, DIFFERENTIAL | 27014 | DS26LS32CN |
| U5 | 230768 | IC, DECODER | 04713 | SN74LS139N |
| U6 | 230547 | IC, QUAD COMPARATOR | 27014 | LM339N/A-1 |
| U7 | 230825 | IC, OCTAL LATCH | 02735 | 74HCT273 |
| U8 | 230771 | IC, OCTAL INVERTING TRI-STATE BUFFER | 04713 | MC74HC240N |
| U9 | 230774 | IC, TRANSISTOR ARRAY | 56289 | ULN-2803A |
| U10 | 230825 | IC, OCTAL LATCH | 02735 | 74HCT273 |
| U11 | 230771 | IC, OCTAL INVERTING TRI-STATE BUFFER | 04713 | MC74HC240N |
| U12 | 230774 | IC, TRANSISTOR ARRAY | 56289 | ULN-2803A |
| U13 | 230825 | IC, OCTAL LATCH | 02735 | 74HCT273 |
| U14 | 230771 | IC, OCTAL INVERTING TRI-STATE BUFFER | 04713 | MC74HC240N |
| U15 | 230774 | IC, TRANSISTOR ARRAY | 56289 | ULN-2803A |
| W1 | 600245 | JUMPER, INSULATED | 52210 | L-2007-1 |
| Z1 | 080005 | RES NETWORK, 6P8R, 10K, 2 PERCENT, .9W | 11236 | 750-61-R10K |
| Z2 | 080008 | RES NETWORK, 16P8R, 1K, 2 PERCENT | 11236 | 761-3-R1K |
| Z3 | 080013 | RES NETWORK, 16P8R, 15K, 2 PERCENT | 11236 | 761-3-R15K |
| Z4 | 080133 | RES NETWORK, CERMET, 68K, 10P9R | 11236 | 750-101-R68K |
| Z5 | 080072 | RES NETWORK, 16P8R, 100K, 2 PERCENT | 11236 | 761-3-R100K |
| Z6 | 080133 | RES NETWORK, CERMET, 68K, 10P9R | 11236 | 750-101-R68K |
| Z7 | 080072 | RES NETWORK, 16P8R, 100K, 2 PERCENT | 11236 | 761-3-R100K |
| Z8 | 080133 | RES NETWORK, CERMET, 68K, 10P9R | 11236 | 750-101-R68K |
| Z9 | 080072 | RES NETWORK, 16P8R, 100K, 2 PERCENT | 11236 | 761-3-R100K |
| Z10-Z15 | 080009 | RES NETWORK, CERMET, 5.8K, 15P8R, 2PCT | 11236 | 761-3-R68K |
| (22)1 | 411954 | PCB, RELAY DRIVER (UNLOADED) | 21793 | 411954 |
| (26)1 | 454996 | SHIELD, VW MODULE | 21793 | 454996 |
| (27)1 | 455513 | PLATE, CONNECTOR MOUNTING | 21793 | 455513 |
| (39)8 | 516251 | SCREW, PPH, SEMS ASSY, 4-40X.250 | 78189 | - |
| (40)3 | 611092 | HARDWARE KIT, D-SUB, 4-40 THD, FEMALE | 00779 | 205817-3 |
| (42)2 | 920971 | FUSE CLIP, PC MOUNT | 75915 | 122088 |

# TABLE OF CONTENTS

THE FOLLOWING INFORMATION IS BOUND SEPARATELY IN VOLUME 1


SECTION 1 GENERAL INFORMATION ..... 1-1

1.1 Introduction ..... 1-1
1.2 The 1250 and 1250 Series Switch modules ..... 1-1
1.3 1250 Series Latching Switch modules ..... 1-4
1.4 Specifications ..... 1-5
1.4.1 1250 Universal Switch Controller ..... 1-5
1.4.2 Option 1250-10 ..... 1-7
1.4.3 Option 1250-12 ..... 1-8
1.4.4 Option 1250-14 ..... 1-10
1.4.5 Option 1250-15 ..... 1-12
1.4.6 Option 1250-16 ..... 1-14
1.4.8 Option 1250-30 Series ..... 1-18
1.4.9 Option 1250-35 ..... 1-22
1.4.10 Option 1250-40 ..... 1-24
1.4.11 Option 1250-40B ..... 1-26
1.4.12 Option 1250-45 ..... 1-28
1.4.13 Option 1250-50 ..... 1-30
1.4.14 Options 1250-51A and 1250-51B ..... 1-32
1.4.15 Options 1250-52A and 1250-52B ..... 1-34
1.4.16 Option 1250-54B ..... 1-36
1.4.17 Option 1250-55B ..... 1-38
1.4.18 Options 1250-60 and 1250-61 ..... 1-41

SECTION 2 INSTALLATION ..... 2-1

2.1 Introduction ..... 2-1
2.2 Unpacking and Inspection ..... 2-1
2.3 Reshipment Instructions ..... 2-1
2.4 Preparation for use ..... 2-1
2.4.1 Power Connections ..... 2-1
2.4.2 Line Voltage Selection ..... 2-2
2.4.3 Power Cord and Grounding ..... 2-3
2.5 1250 Series Plug-in Modules ..... 2-3
2.5.1 Switch modules ..... 2-3
2.5.2 Switching Module Installation ..... 2-3
2.5.3 Strain Relief Screw Terminals ..... 2-4
2.6 GPIB interface ..... 2-5
2.6.1 GPIB Bus Organization ..... 2-5

2.6.2 GPIB Interconnections ..... 2-7
2.6.3 GPIB Cable Length Limits ..... 2-7
2.6.4 GPIB Address Assignment ..... 2-7
2.6.5 GPIB Rear-Panel Connector ..... 2-9
2.6.6 GPIB Interface Signal Pin Assignments ..... 2-10
2.7 Equipment Rack Installation ..... 2-11
2.7.1 Introduction ..... 2-11
2.7.2 Slide-Mount Option 65 Installation ..... 2-12

| | | |
|---|---|---|
| 2.8 | Intelligent Front Panel (Option 90) Installation | 2-20 |
| 2.8.1 | Standard Mounting | 2-20 |
| 2.8.2 | Remote Mounting | 2-20 |
| 2.8.3 | Rear-Forward Rack Mounting | 2-20 |
| 2.8.4 | Standard Mounting | 2-20 |
| 2.8.5 | Remote Mounting | 2-22 |
| 2.9 | Storage and Temperature | 2-23 |
| 2.10 | Ventilation Requirements | 2-23 |
| SECTION 3 | OPERATION | 3-1 |
| 3.1 | Introduction | 3-1 |
| 3.2 | 1250 Home State | 3-1 |
| 3.3 | 1250 Front and Rear Panels | 3-2 |
| 3.4 | GPIB Input Format | 3-4 |
| 3.5 | GPIB Output Format | 3-5 |
| 3.6 | Serial Poll Status Byte | 3-5 |
| 3.7 | Power-up Self Tests | 3-6 |
| 3.8 | Device Dependant Command Codes | 3-7 |
| 3.9 | 1250 Series Module Specific Syntax | 3-18 |
| 3.9.1 | 1250-10 Breadboard Module Specific Syntax | 3-18 |
| 3.9.2 | 1250-12 Relay Actuator Module Specific Syntax Specific Syntax | 3-19 |
| 3.9.3 | 1250-14 Digital Input/Output Module Specific Syntax | 3-21 |
| 3.9.4 | 1250-15 Relay Driver Module Specific Syntax | 3-24 |
| 3.9.4.7 | 1250-15 Confidence Mode Support | 3-26 |
| 3.9.5 | 1250-16 High Density Signal Switching Module Specific Syntax | 3-28 |
| 3.9.6 | 1250-20 Relay Power Module Specific Syntax | 3-30 |
| 3.9.7 | 1250-30 Scanner / Multiplexer Module Specific Syntax | 3-32 |
| 3.9.9 | 1250-40 Module Specific Syntax | 3-48 |
| 3.9.10 | 1250-40B Module Specific Syntax | 3-50 |
| 3.9.11 | 1250-45 Module Specific Syntax | 3-52 |
| 3.9.12 | 1250-50, 1250-51A and 1250-51B, R.F. Multiplexer Module Specific Syntax | 3-54 |
| 3.9.13 | 1250-52A and 1250-52B R.F. Multiplexer Module Specific Syntax | 3-56 |
| 3.9.14 | 1250-54B and 1250-55B RF Multiplexer Module Specific Syntax | 3-58 |
| 3.9.15 | 1250-60 and 1250-61 Microwave Switching Module Specific Syntax | 3-60 |
| 3.10 | Local Control | 3-62 |
| 3.10.1 | Introduction | 3-62 |
| 3.10.2 | 1250 Intelligent Front Panel (Option 90) | 3-62 |
| 3.10.3 | Local Operation | 3-66 |
| 3.10.3.1 | Introduction | 3-66 |
| 3.10.3.2 | OPEN and CLOSE keys | 3-66 |
| 3.10.3.3 | READ and WRITE keys | 3-67 |
| 3.10.3.4 | STORE and RECALL keys | 3-68 |
| 3.10.3.5 | TEST key | 3-69 |
| 3.10.3.6 | LOCAL key | 3-70 |
| 3.10.3.7 | TRIG / SCAN key | 3-70 |
| 3.10.3.8 | VIEW key | 3-70 |
| 3.10.3.9 | EDIT key | 3-72 |

3.10.3.10 DEL key . . . . . 3-73
3.10.3.11 CLR key . . . . . 3-73
3.10.3.12 EXEC key . . . . . 3-73
3.10.3.13 RESET key . . . . . 3-73
3.10.3.14 ERR key . . . . . 3-73
3.10.3.15 DISPLAY keys . . . . . 3-74

SECTION 4 OPERATION VERIFICATION . . . . . 4-1

---

THE FOLLOWING INFORMATION IS BOUND SEPARATELY IN VOLUME 2

SECTION 5 CHASSIS DRAWINGS . . . . . 5-1

404361 Chassis Assembly . . . . . 5-2

401744 PCB Assy., Interconnection . . . . . 5-4
431744 Schematic, Interconnection . . . . . 5-5

401743 PCB Assy., Computer . . . . . 5-6
431743 Schematic, Computer . . . . . 5-7

404362 Power Supply Assembly . . . . . 5-12
401742 PCB Assy., Power Supply . . . . . 5-13
431742 Schematic, Power Supply . . . . . 5-14

401758 PCB Assy., Analog Bus . . . . . 5-15
431758 Schematic, Analog Bus . . . . . 5-16

SECTION 6 MODULE DRAWINGS . . . . . 6-1

Options

404447 Option 10, Breadboard Assembly . . . . . 6-4
401754 PCB Assembly, Breadboard . . . . . 6-5
431754 Schematic, Breadboard . . . . . 6-6

404448 Option 12, Actuator Assembly . . . . . 6-8
401753 PCB Assy., Actuator . . . . . 6-9
431753 Schematic, Actuator . . . . . 6-10

404455 Option L12, Relay Actuator Module Assembly - Mechanically Latching . . . . . 6-13
404388 QD Assy., Terminal . . . . . 6-14
401793 PCB Assy., Actuator . . . . . 6-15
431793 Schematic, Actuator . . . . . 6-16

401748 Option 14, Digital I/O Assembly . . . . . 6-19
431748 Schematic, Digital I/O . . . . . 6-20

404446 Option 15, Relay Driver Assembly . . . . . 6-24
401759 PCB Assy., Relay Driver . . . . . 6-25
431759 Schematic, Relay Driver . . . . . 6-26

401889 Option 16, High Density Signal Switching Card . . . . . 6-28
431889 Schematic, High Density Signal Switching Card . . . . . 6-29

404445 Option 20, Power Module Assembly . . . . . 6-33
401757 PCB Assy., Power Module . . . . . 6-34
431757 Schematic, Power Module . . . . . 6-35

404444 Option 30, Scanner/Mux Module Assembly . . . . . 6-38
401755 PCB Assy., Scanner/Mux Module . . . . . 6-39
431755 Schematic, Scanner/Mux Module . . . . . 6-40

404456 Option L30, Signal Multiplexer - Mechanically Latching . . . . . 6-43
404388 QD Assy., Terminal . . . . . 6-14
401792 PCB Assy., Signal Multiplexer . . . . . 6-44
431792 Schematic, Signal Multiplexer . . . . . 6-45

404707 Option 30B, Signal Multiplexer . . . . . 6-48
401900 PCB Assy., Signal Multiplexer . . . . . 6-49
431900 Schematic, Signal Multiplexer . . . . . 6-50

404612 Option 30C, Scanner/Mux Module Assembly . . . . . 6-56
401755-001 PCB Assy., Scanner/Mux Module . . . . . 6-57
431755-001 Schematic, Scanner/Mux Module . . . . . 6-58

| | | |
|---|---|---|
| 404613 | Option 30D, Scanner/Mux Module Assembly | 6-61 |
| 401755-002 | PCB Assy., Scanner/Mux Module | 6-62 |
| 431755-002 | Schematic, Scanner/Mux Module | 6-63 |
| 401961 | Option 35, Signal Multiplexer, 4(1x6), 4-Wire | 6-66 |
| 431961 | Schematic, Signal Multiplexer | 6-67 |
| 404443 | Option 40, Matrix Module Assembly | 6-78 |
| 401756 | PCB Assy., Matrix Module | 6-79 |
| 431756 | Schematic, Matrix Module | 6-80 |
| 404457 | Option L40, Signal Matrix - Mechanically Latching | 6-83 |
| 404388 | QD Assy., Terminal | 6-14 |
| 401791 | PCB Assy., Signal Matrix | 6-84 |
| 431791 | Schematic, Signal Matrix | 6-85 |
| 404711 | Option 40B, Signal Matrix, 4x5, 4-Wire | 6-88 |
| 401896 | PCB Assy., Signal Matrix | 6-89 |
| 431896 | Schematic, Signal Matrix | 6-90 |
| 404712 | Option 45, Signal Matrix, 4x12, 2-Wire | 6-94 |
| 401898 | PCB Assy., Signal Matrix | 6-95 |
| 431898 | Schematic, Signal Matrix | 6-96 |
| 401745 | Option 50, 200 MHz, 4/4:1 RF Multiplexer | 6-104 |
| 431745 | Schematic, 200 MHz, 4/4:1 RF Multiplexer | 6-105 |
| 401749 | Option 51A, 500 MHz, 2/4:1 RF Multiplexer | 6-108 |
| 431749 | Schematic, 500 MHz, 2/4:1 RF Multiplexer | 6-110 |
| 404368 | Option 51B, 500 MHz, 4/4:1 RF Multiplexer | 6-109 |
| 431749 | Schematic, 500 MHz, 4/4:1 RF Multiplexer | 6-110 |
| 401750 | Option 52A, 1 GHz x 2 RF Multiplexer | 6-113 |
| 431750 | Schematic, 1 GHz x 2 RF Multiplexer | 6-115 |
| 404369 | Option 52B, 1 GHz x 4 RF Multiplexer | 6-114 |
| 431750 | Schematic, 1 GHz x 4 RF Multiplexer | 6-115 |
| 401790 | Option L52B, RF Multiplexer, 1 GHz - Mechanically Latching | 6-118 |
| 431790 | Schematic, RF Multiplexer | 6-119 |

404642 Option 54B, Terminated 50 Ohm 1 GHz Module . . . . . 6-123
431887 Schematic, Terminated 50 Ohm 1 GHz Module . . . . . 6-124

401895 Option 55B, Terminated 75 Ohm 1 GHz Module . . . . . 6-130
431895 Schematic, Terminated 75 Ohm 1 GHz Module . . . . . 6-131

401751 Option 60A, 18 GHz x 2 Switch Module . . . . . 6-137
431751 Schematic, 18 GHz x 2 Switch Module . . . . . 6-141

404370 Option 60B, 18 GHz x 4 Switch Module . . . . . 6-138
431751 Schematic, 18 GHz x 4 Switch Module . . . . . 6-141

404371 Option 61A, 26.5 GHz x 2 Switch Module . . . . . 6-139
431751 Schematic, 26.5 GHz x 2 Switch Module . . . . . 6-141

404372 Option 61B, 26.5 GHz x 4 Switch Module . . . . . 6-140
431751 Schematic, 26.5 GHz x 4 Switch Module . . . . . 6-141

404381 Option 80, Terminal Block . . . . . 6-144
401761 PCB Assy., Shield Common . . . . . 6-145

404363 Option 90, Keyboard/Display Assembly . . . . . 6-146
401741 PCB Assy., Keyboard/Display . . . . . 6-148
431741 Schematic, Keyboard/Display . . . . . 6-149

SECTION 7 CHASSIS PARTS LISTS . . . . . 7-1

404361 Chassis Assembly . . . . . 7-2

401744 PCB Assy., Interconnection . . . . . 7-3

401743 PCB Assy., Computer . . . . . 7-4

404362 Power Supply Assembly . . . . . 7-7
401742 PCB Assy., Power Supply . . . . . 7-9

401758 PCB Assy., Analog Bus . . . . . 7-11

SECTION 8 MODULE PARTS LISTS . . . . . 8-1

Options

404447 Option 10, Breadboard Assembly . . . . . 8-3
401754 PCB Assembly, Breadboard . . . . . 8-4

404448 Option 12, Actuator Assembly . . . . . 8-5
401753 PCB Assy., Actuator . . . . . 8-6

404455 Option L12, Relay Actuator Module Assembly - Mechanically Latching . . . . . 8-7
404388 QD Assy., Terminal . . . . . 8-7
401793 PCB Assy., Actuator . . . . . 8-8

401748 Option 14, Digital I/O Assembly . . . . . 8-9

404446 Option 15, Relay Driver Assembly . . . . . 8-11
401759 PCB Assy., Relay Driver . . . . . 8-12

401889 Option 16, High Density Signal Switching Card . . . . . 8-14

404445 Option 20, Power Module Assembly . . . . . 8-15
401757 PCB Assy., Power Module . . . . . 8-16

404444 Option 30, Scanner/Mux Module Assembly . . . . . 8-17
401755 PCB Assy., Scanner/Mux Module . . . . . 8-18

404456 Option L30, Signal Multiplexer - Mechanically Latching . . . . . 8-20
404388 QD Assy., Terminal . . . . . 8-7
401792 PCB Assy., Signal Multiplexer . . . . . 8-21

404707 Option 30B, Signal Multiplexer . . . . . 8-22
401900 PCB Assy., Signal Multiplexer . . . . . 8-23

404612 Option 30C, Scanner/Mux Module Assembly . . . . . 8-17
401755-001 PCB Assy., Scanner/Mux Module . . . . . 8-18

404613 Option 30D, Scanner/Mux Module Assembly . . . . . 8-17
401755-002 PCB Assy., Scanner/Mux Module Assembly . . . . . 8-18

401961 Option 35, Signal Multiplexer, 4(1x6), 4-Wire . . . . . 8-25

404443 Option 40, Matrix Module Assembly . . . . . 8-27
401756 PCB Assy., Matrix Module . . . . . 8-28

| | | |
|---|---|---|
| 404457 | Option L40, Signal Matrix - Mechanically Latching | 8-30 |
| 404388 | QD Assy., Terminal | 8-7 |
| 401791 | PCB Assy., Signal Matrix | 8-31 |
| 404711 | Option 40B, Signal Matrix, 4x5, 4-Wire | 8-32 |
| 401896 | PCB Assy., Signal Matrix | 8-33 |
| 404712 | Option 45, Signal Matrix, 4x12, 2-Wire | 8-34 |
| 401898 | PCB Assy., Signal Matrix | 8-35 |
| 401745 | Option 50, 200 MHz, 4/4:1 RF Multiplexer | 8-37 |
| 401749 | Option 51A, 500 MHz, 2/4:1, RF Multiplexer | 8-39 |
| 404368 | Option 51B, 500 MHz, 4/4:1 RF Multiplexer | 8-41 |
| 401750 | Option 52A, 1 GHz x 2 RF Multiplexer | 8-43 |
| 404369 | Option 52B, 1 GHz x 4 RF Multiplexer | 8-45 |
| 401790 | Option L52B, RF Multiplexer, 1 GHz - Mechanically Latching | 8-47 |
| 404642 | Option 54B, Terminated 50 Ohm 1 GHz Module | 8-49 |
| 401895 | Option 55B, Terminated 75 Ohm 1 GHz Module | 8-51 |
| 401751 | Option 60A, 18 GHz x 2 Switch Module | 8-53 |
| 404370 | Option 60B, 18 GHz x 4 Switch Module | 8-55 |
| 404371 | Option 61A, 26.5 GHz x 2 Switch Module | 8-57 |
| 404372 | Option 61B, 26.5 GHz x 4 Switch Module | 8-59 |
| 404381 | Option 80, Terminal Block | 8-61 |
| 401761 | PCB Assy., Shield Common | 8-61 |
| 404363 | Option 90, Keyboard/Display Assembly | 8-62 |
| 401741 | PCB Assy., Keyboard/Display | 8-63 |

# SECTION 1 GENERAL INFORMATION

## 1.1 Introduction

1.1.1 This manual provides the information necessary to install and operate the Racal-Dana Model 1250 Universal Switch Controller. Section two (Installation) provides the procedures necessary to unpack and inspect the 1250, install the intelligent front panel, install 1250 Series switch modules in the chassis and connect the 1250 to the GPIB. Section three (Operation) provides the command codes and keystrokes required in both local and remote control of the 1250.

## 1.2 The 1250 and 1250 Series Switch modules

1.2.1 The 1250 Universal Switch Controller allows signals to be switched in a single system from DC to 26.5 GHz. The 1250 Series is a general purpose switching system designed for both manual and automatic test systems. Low level, power, R.F. and microwave switching requirements are addressed by the switch modules available in the 1250 Series.

1.2.2 The 1250 is designed for use in automatic test systems, but local control of the switching system is supported by Option 90, which supplies an intelligent front panel with a display and keyboard. Refer to Figures 1-1 and 1-2 for illustrations of the 1250 front panel and Option 90, the intelligent front panel, respectively.

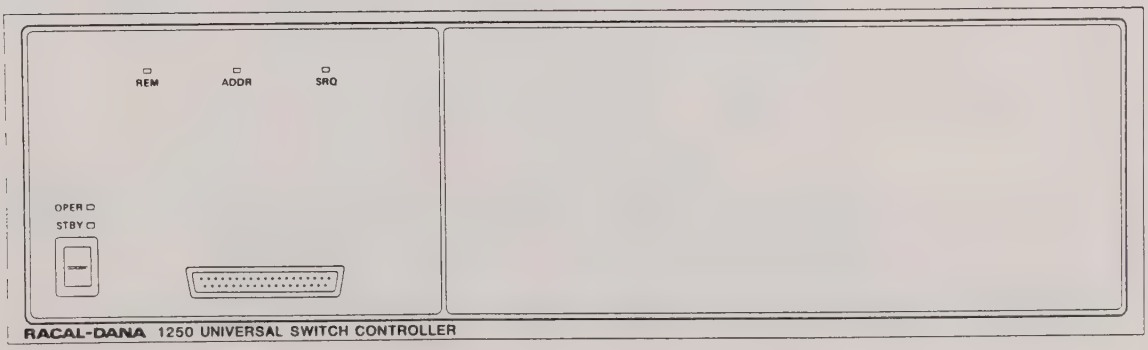



Figure 1-1, 1250 Front Panel

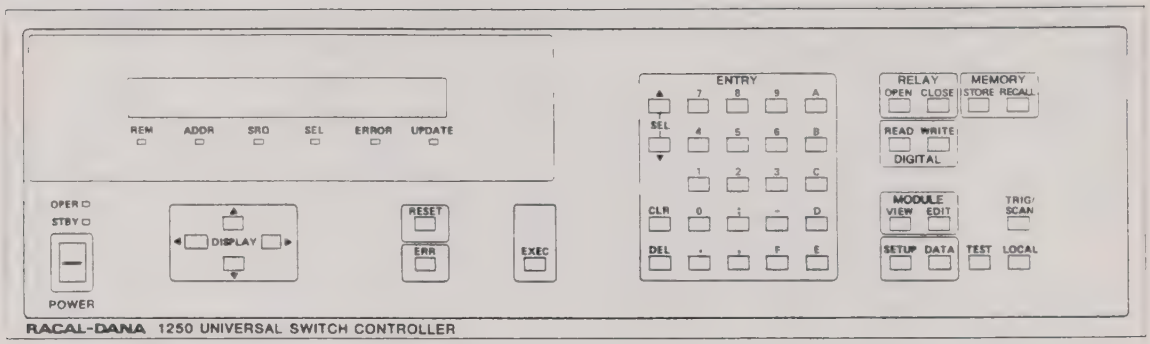



**Figure 1-2, 1250 Option 90, Intelligent Front Panel**

1.2.3 Extensive software capabilities are available for use in the 1250. These include:

**Exclude Lists**

The exclusion of possibly dangerous or damaging system configurations from the configurations that the 1250 regards as valid is available via an Exclude list.

**Equate Lists**

The equating together of more than one switching module to reduce programming time, so that a command sent to one equated module is obeyed by all of the modules equated together.

**Scan Lists**

A list of relays that may be entered into a Scan list that will be sequenced through on receipt of a trigger pulse, use of the Manual key on the front panel or the GPIB Group Execute Trigger (GET) command.

**Confidence**

A non-destructive confidence check mode which can monitor the state of all relays in the chassis to ensure that all 1250 Series switch modules fitted to the 1250 chassis have operated as programmed.

**Power Up Recall**

The automatic recalling of a switching system configuration from non-volatile memory at power up

**Test**

A self-test capability to ensure that the system ROM, RAM, CPU, backplane and switching module handshaking are functioning correctly. This test is carried out at power up and may also be invoked over the GPIB or the optional front panel.

**Non-Volatile Memory**

A 47 location non-volatile memory for the storage and recall of complete switching system configurations.

1.2.4 The 1250 is of a modular construction that allows easy removal and replacement of all major assemblies. These assemblies are as follows:

1) Switch modules

2) Card Cage

3) Microprocessor Controller

4) Power Supply

5) (Optional) Front Panel

1.2.5 The signals to be switched by the 1250 are routed through up to five plug-in relay cards installed in the 1250 chassis. These plug-in cards allow the 1250 System to be easily reconfigured as required.

1.2.6 The switching capabilities of the 1250 are enhanced by providing a 10-wire Analog bus. This allows switch modules to be interconnected to expand beyond the capabilities of each individual switching module. This is particularly useful in configuring large switching matrices. The Analog Bus may also be cut to separate selected 1250 Series modules, as required.

## 1.3 1250 Series Latching Switch modules

1.3.1 Several of the 1250 Series switch modules are also available in latching versions. A latching switching module will retain its configuration even when power is removed from the 1250 chassis. These switch modules perform electrically the same as the non-latching switch modules that they are based on and use a similar 1250 Series option number. The latching feature is indicated by the presence of the letter 'L' in the option number, e.g. 1250-L30.

1.3.2 The 1250 Series latching switch modules available are as follows:

| | |
|---|---|
| 1250-L12 | Latching Relay Actuator Module |
| 1250-L30 | Latching 20 Channel Signal Multiplexer |
| 1250-L40 | Latching 4 x 4 Matrix |
| 1250-L52B | Latching RF Multiplexer |

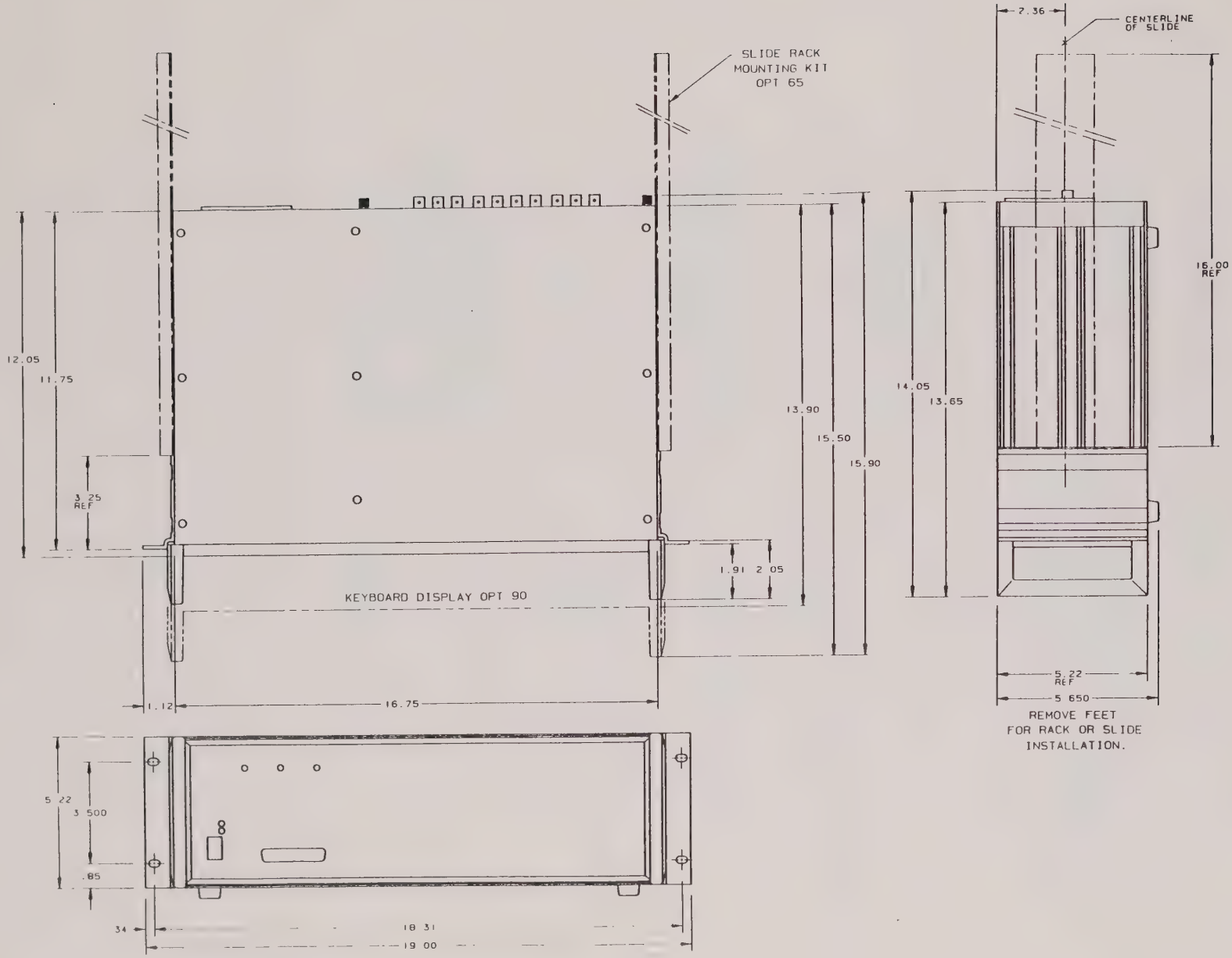
1.3.3 The command codes required to operate the 1250 Series latching switch modules are the same as those required to operate the non-latching versions.

## 1.4 Specifications

### 1.4.1 1250 Universal Switch Controller

#### General

| | |
|---|---|
| **Annunciators:** | 2 status LED indicators<br>3 GPIB LED indicators<br>16 character alphanumeric display (Option 90) |
| **AC Voltage Requirements:** | 100, 115, 215, 230 VAC ± 10%<br>47-66 Hz (400 Hz operation also available. Contact Racal-Dana for details.) |
| **Dimensions:** | 133.4 mm (5.25 in) High x 421.6 mm (16.6 in) Wide x 304.8 mm (12 in) Deep |
| **Weight:** | Main Chassis: 11.4 kg (25 lb.) |
| **Rack Mounting:** | Standard or reversed positions |
| **Environmental:** | Designed to meet MIL-T-28800C Type III, Class 5, Style F |
| **Temperature Range:** | 0°C to 50°C operation<br>-40°C to 70°C storage |
| **Humidity:** | 95% Noncondensing |
| **Vibration:** | 0.013 in. double-amplitude, 20-55 Hz; designed to meet MIL-T-28800C Type III, Class 5, Style F |
| **GPIB Transfer Rate:** | 10 kHz typical |


SLIDE RACK
MOUNTING KIT
OPT 65
12.05
11.75
3.25
REF
13.90
15.50
15.90
1.91
2.05
KEYBOARD DISPLAY OPT 90
1.12
16.75
5.22
3.500
.85
.34
18.31
19.00
7.36
CENTERLINE
OF SLIDE
16.00
REF
14.05
13.65
5.22
REF
5.650
REMOVE FEET
FOR RACK OR SLIDE
INSTALLATION.

**IEEE-488-1978 Standard Interface Subset Capability**

| GPIB Subset | Description | Applicable Capability |
|---|---|---|
| SH1 | Source Handshake | Complete Capability |
| AH1 | Acceptor Handshake | Complete Capability |
| T6 | Talker | Complete Capability<br>(1) Basic Talker<br>(2) Serial Poll<br>(3) Unaddress if MLA |
| TI0 | Extended Talker | None |
| L4 | Listener | Complete except Listen Only<br>(1) Basic Listener<br>(2) Unaddress if MTA |
| LE0 | Extended Listener | None |
| SR1 | Service Request | Complete Capability |
| RL1 | Remote/ Local | Complete Capability<br>(1) REN-Remote Enable<br>(2) LLO-Local Lockout<br>(3) GTL-Go to Local |
| PP0 | Parallel Poll | No Capability |

### 1.4.2 Option 1250-10

The 1250-10 Breadboard module is designed to allow the user to create custom circuits and incorporate them under switching system control. Forty square inches of surface area are provided for user implementation of designs. Fused +5V and +13 V DC supplies are provided and LEDs indicate the status of each supply. Latched inputs and outputs interface to the system backplane to allow programming via the GPIB.

**Specifications**

**I/O Characteristics**

| | |
|---|---|
| **Power:** | +13V DC ± 10% at 1.7 A (Fused)<br>+5V DC ± 10 % at 1.7 A (Fused) |
| **Interface to User Circuitry:** | |
| Inputs: | 24 LS - TTL Compatible |
| Outputs: | 24 LS - TTL Compatible |

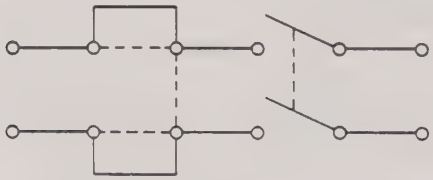
**General**

| | |
|---|---|
| User Connector: | Quick Disconnect screw terminal (1250-80) |
| Breadboard Area: | 40 square inches |
| Mounting Holes: | 0.1" spacing |
| Maximum component height: | 0.5" |
| Maximum lead length below board: | 0.062" |

## 1.4.3 Option 1250-12

### Description

The 1250-12 is designed for general purpose signal switching and actuation of external devices. Each channel switches up to 2 amps and 250 V dc or 250 V rms. Relay contacts are monitored to provide user selectable confidence checking. Each channel provides mounting holes to allow the addition of shunt and series elements such as arc suppressors, filters, etc.



Model 1250-12. Ten independent relays. One channel is shown, with provision for addition of series and shunt elements.

**Specifications**

| | |
|---|---|
| Switch configuration: | Ten DPST |
| User Connector: | Quick Disconnect screw terminal (1250-80) |
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 250 VDC, 250 VAC RMS and 350 VAC pk |
| Maximum Switchable Current per channel: | 2 A DC or rms |
| Maximum Switchable Power per channel: | 60 W DC, 500 VA AC |

**DC Performance**

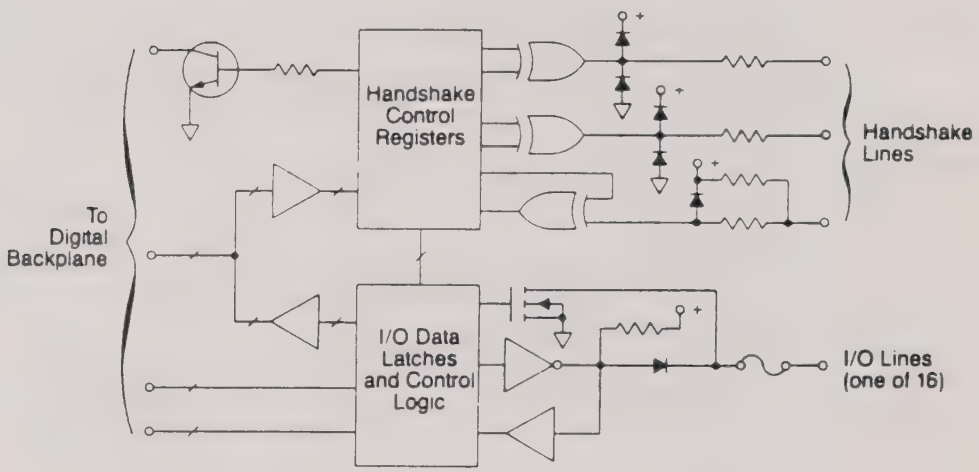
| | |
|---|---|
| Differential Thermal Offset: | < 3 $\mu$V per channel, |
| Path Resistance: | 200 milliohm at 2A |
| Isolation (40° C, 50 % RH) | |
| Open Channel, channel-channel: | $>10^{11}$ ohms |
| Channel-Chassis: | $>5x10^{10}$ ohms |
| Hi-Lo: | $>10^{11}$ ohms |

**AC Performance**

| | |
|---|---|
| Capacitance | |
| Open Channel: | <5 pF |
| Channel-Channel: | <5 pF |
| Channel-Chassis: | <15 pF |
| Hi-Lo: | <10 pF |
| Bandwidth, (-3 dB, 50 ohm termination): | 20 Mhz |
| Insertion Loss, (50 ohm termination): | <.20 dB at 100 kHz<br><.25 dB at 1 MHz<br><0.5 dB at 10 MHz |
| Crosstalk, (50 ohm termination): | <-75 dB at 100 kHz<br><-60 dB at 1 MHz<br><-40 dB at 10 MHz |
| Switching Time: | ≤ 10 ms / channel |

### 1.4.4 Option 1250-14

The 1250-14 Digital I/O Module provides 16 digital input/output lines for the generation of control signals, digital stimulus and the input of digital responses. Data can be manipulated in a byte or a word format. The module memory supports storage of up to 127 16 bit words or 254 8 bit bytes for input or output operations. Five input/output control modes are available: two static modes, two strobe modes and one full handshake mode.



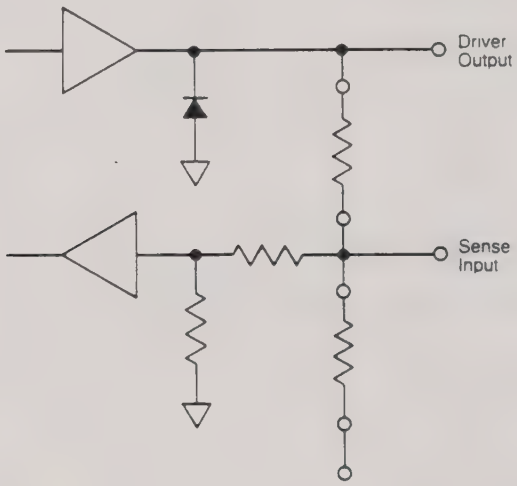
**Specifications**

| | |
|---|---|
| User Connector: | 40 pin DIL |
| I/O Lines: | 16, each fused |
| Data Rate: | Static to > 1 kHz |
| Output | |
| $V_{out}$ (High): | ≥ 2.4 V at 8 mA |
| $V_{out}$ (Low): | ≤ 0.4 V at 126 mA |
| $I_{low}$ (Max): | 125 mA at $V_{out}$ (Low) |
| Input | |
| $V_{in}$ (High): | ≥ 2.0 V |
| $V_{in}$ (Low): | ≤ 0.4 V |
| $V_{in}$ (Max): | 30 VDC (line to chassis) |
| Handshake Lines: | 3 |
| Output Characteristics: | |
| $V_{out}$ (High): | ≥ 2.4 V at 400 $\mu$A output |
| $V_{out}$ (Low): | ≤ 0.5 V at 2 mA output |
| Input Characteristics: | |
| $V_{in}$ (High): | ≥ 2.0 V |
| $V_{in}$ (Low): | ≤ 0.8 V |
| $V_{in}$ (Max): | ≤ 5 V |

## 1.4.5 Option 1250-15

### Description

The 1250-15 Relay Driver Module is designed for applications where it is necessary to locate relays externally. Each module provides 20 current sink output drivers and 20 high impedance sense inputs. Sense feedback circuitry supports confidence testing for these external relays. An internal +13V supply is available as a source for relay coil currents. External supplies up to +40V may also be used.



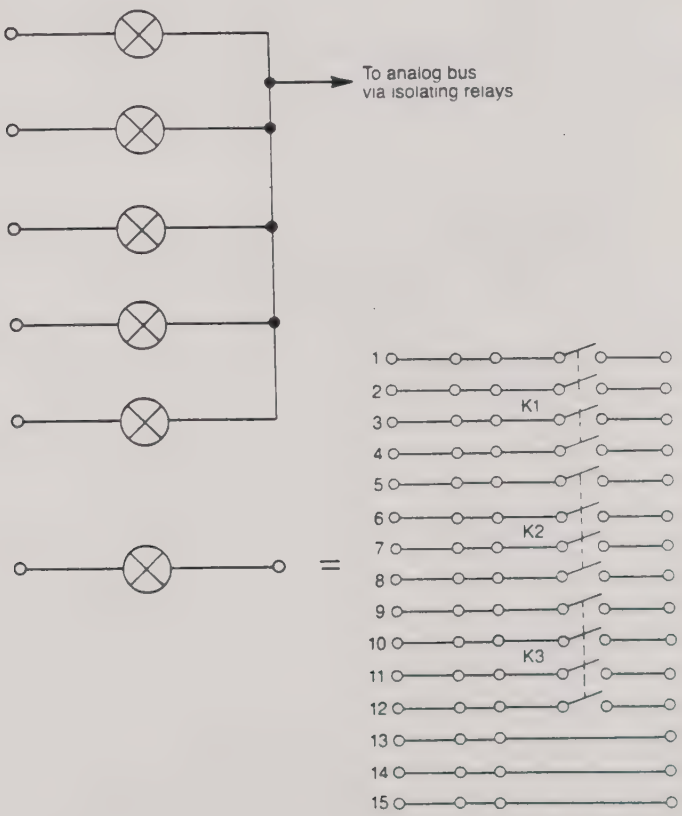
**Specifications**

| | |
|---|---|
| User Connector: | Quick Disconnect screw terminal (1250-80) |
| Maximum Voltage at Output Driver | |
| Off: | 40 V |
| On: | 1.6 V |
| Maximum Current: | |
| Per Driver: | 350 mA |
| Per Module: | 3 A |
| Number of Channels: | 20 |
| Sense Input Voltage | |
| Relay OFF: | 9 - 40 V |
| Relay ON: | 0 - 1.6 V |
| Sense Input Impedance: | 150 kΩ |
| Internal Supply: | +13 V at 1.7 A (Fused) |

## 1.4.6 Option 1250-16

### Description

The 1250-16 is designed for general purpose multiple line switching up to 10 MHz. Each channel switches up to 2 amps and 250 V. Relay contacts are monitored to provide user selectable confidence checking. Separate isolating relays allow 10 lines to access the Analog bus. The 1250-16 is configured as five channels to a common bus, with fifteen lines per channel, twelve of which are switched. Jumpers at the relays allow for user reconfiguration.



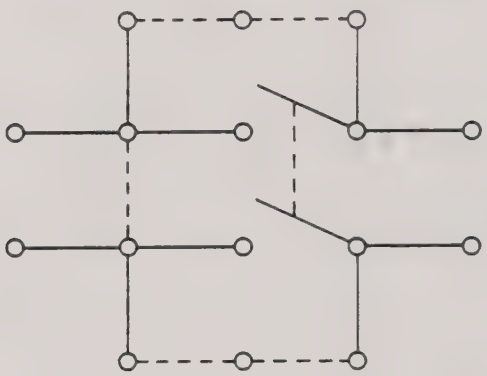
**Specifications**

| | |
|---|---|
| Switch configuration: | Five channels, twelve lines per channel, switched to a common 12 line bus. |
| User Connector: | D-type subminiature |
| Maximum Switchable Voltage | 250 VDC, 250 VAC RMS and 350 VAC pk |
| Maximum Switchable Current: | 2 A DC or AC rms |
| Maximum Switchable Power: | 60 W DC, 500 VA AC |
| **DC Performance** | |
| Path Resistance: | 600 milliohm at 2A DC |
| **AC Performance** | |
| Bandwidth, (-3 dB, 50 ohm termination): | 10 Mhz |
| Switching Time: | ≤ 10 ms |

## 1.4.7 Option 1250-20

### Description

The 1250-20 Power switching module provides switching for AC or DC power supplies and current sources. Switching networks may be configured from the ten independant DPST relays provided. The 1250-20 switches up to 8 A at 250 VAC rms or 5 A at 48 VDC. Relay contacts are monitored to provide user selectable confidence checking. Each channel provides mounting holes to allow the addition of shunt and series elements such as arc suppressors, filters, etc. A fused +13 V DC supply is provided for driving external relays. Separate connections to both sides of the relay allow each channel to function independantly or to be configured as custom networks.



**Specifications**

| | |
|---|---|
| Switch configuration: | 10 DPST |
| User Connector: | Quick Disconnect screw terminal (1250-80) |
| Maximum Switchable Voltage | 250 VDC, 250 VAC RMS or 350 VAC pk |
| Maximum Switchable Current (DC or AC rms) | |
| Per Terminal: | 5 A |
| Per Channel: | 8 A |
| Per Module: | 30 A |
| Maximum Switchable Power | |
| Per Terminal: | 150 W DC, 1250 VA |
| Per Channel: | 240 W DC, 2000 VA |
| Per Module: | 900 W DC, 7500 VA |

**DC Performance**

| | |
|---|---|
| Path Resistance: | 150 milliohm at 5A DC |

**AC Performance**

| | |
|---|---|
| Bandwidth, (-3 dB, 50 ohm termination): | 20 Mhz |
| Switching Time: | ≤ 15 ms |

## 1.4.8 Option 1250-30 Series

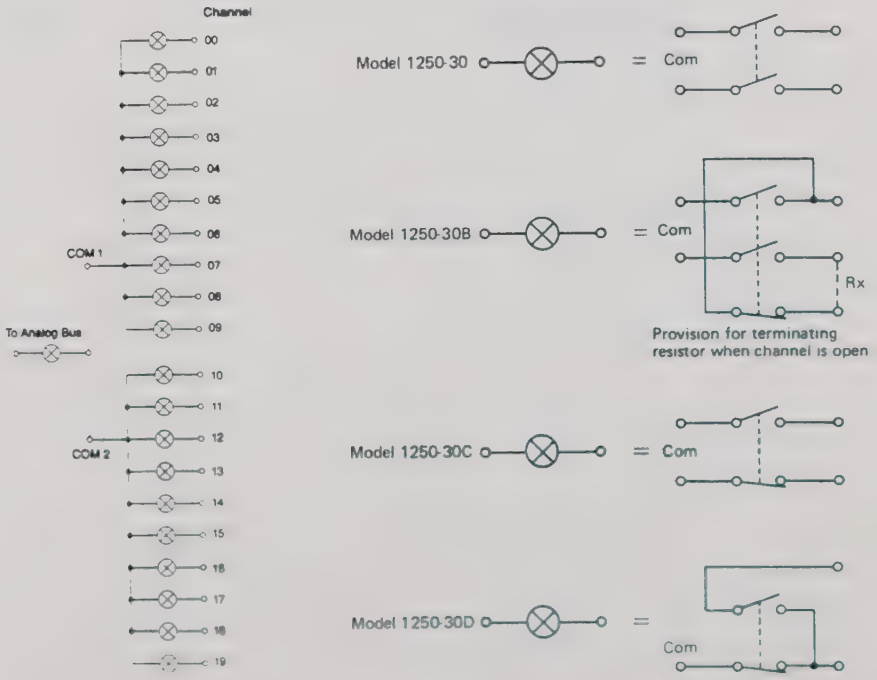
### Description

The 1250-30 Series Scanner/Multiplexer Switch modules are configurable as a 20x1 two wire or two 10x1 two wire multiplexer networks for use at up to 20 MHz. For larger multiplexers or scanners, the analog bus may be accessed via a separate relay. Relay coil currents are monitored to provide user selectable confidence checking. Each channel provides mounting points to allow the addition of shunt and series elements such as arc suppressors, filters, etc.

The 1250-30B Scanner / Multiplexer provides either one 1 x 20, two 1 x 10 or two 1 x 5 and two 1 x 4 two wire multiplexers for use at frequencies up to 20 MHz. All configurations are user selectable. The 1250-30B allows the automatic connection to each channel of a user specified termination when the channel is open.

The 1250-30C Scanner / Multiplexer provides either one 1 x 20 or two 1 x 10 one wire multiplexers for use at frequencies up to 20 MHz. All configurations are user selectable.

The 1250-30D Scanner / Multiplexer provides either one 1 x 20 or two 1 x 10 one wire multiplexers for use at frequencies up to 20 MHz. The 1250-30D supports applications where regular calibration is required without removal of instruments fron the system. All configurations are user selectable.



**Scanner / Multiplexer Module Model 1250-30B Specifications**

| | |
|---|---|
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 250 VDC or AC rms, 350 VAC Peak |
| Maximum Switchable Current (DC or AC rms) Per Channel: | 2 A |
| Maximum Switchable Power | |
| Per Channel: | 60 WDC, 500 VA |
| Per Module: | 60 WDC, 500 VA |

**DC Performance**

| | |
|---|---|
| Differential Thermal Offset: | 3 $\mu$V per channel |
| Path Resistance: | 300 millohm at 2 ADC |
| Isolation | |
| Open Channel, Channel-Channel: | $>10^{11}$ohm |
| Channel-Chassis: | $>10^{10}$ ohm |
| High-Low: | $>10^{11}$ohm |

**AC Performance**

| | |
|---|---|
| Capacitance | |
| Open Channel: | <10 pF |
| Channel-Channel: | <10 pF |
| Channel-Chassis: | <125 pF |
| High-Low: | <20 pF |
| Bandwidth (-3dB): | 20 MHz (50 ohm termination) |
| Insertion Loss (50 Ohm Termination) | |
| 100 kHz: | <0.20 dB |
| 1 MHz: | <0.25 dB |
| 10 MHz: | <1.50 dB |
| Cross Talk (50 Ohm Termination) | |
| 100 kHz: | -70dB |
| 1 MHz: | -55 dB |
| 10 MHz: | -36dB |
| Switching Time: | 10 mSec per channel |

## Scanner / Multiplexer Module Model 1250-30C Specifications

| | |
|---|---|
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 250 VDC or AC rms, 350 VAC Peak |
| Maximum Switchable Current (DC or AC rms) per Channel: | 2 A |
| Maximum Switchable Power | |
| Per Channel: | 60 WDC, 500 VA |
| Per Module: | 60 WDC, 500 VA |

**DC Performance**

| | |
|---|---|
| Differential Thermal Offset: | 3 $\mu$V per channel |
| Path Resistance: | 300 millohm at 2 ADC |
| Isolation | |
| Open Channel, Channel-Channel: | $>10^{11}$ohm |
| Channel-Chassis: | $>10^{10}$ ohm |
| High-Low: | $>10^{11}$ohm |

**AC Performance**

| | |
|---|---|
| Capacitance | |
| Open Channel: | <10 pF |
| Channel-Channel: | <10 pF |
| Channel-Chassis: | <125 pF |
| High-Low: | <20 pF |
| Bandwidth (-3dB): | 20 MHz (50 ohm termination) |
| Insertion Loss (50 Ohm Termination) | |
| 100 kHz: | <0.20 dB |
| 1 MHz: | <0.25 dB |
| 10 MHz: | <1.50 dB |
| Cross Talk (50 Ohm Termination) | |
| 100 kHz: | -70dB |
| 1 MHz: | -55 dB |
| 10 MHz: | -36dB |
| Switching Time: | 10 mSec per channel |

## Scanner / Multiplexer Module Model 1250-30D Specifications

| | |
|---|---|
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 250 VDC or AC rms, 350 VAC Peak |
| Maximum Switchable Current (DC or AC rms) Per Channel: | 2 A |
| Maximum Switchable Power | |
| Per Channel: | 60 WDC, 500 VA |
| Per Module: | 60 WDC, 500 VA |

### DC Performance

| | |
|---|---|
| Differential Thermal Offset: | 3 $\mu$V per channel |
| Path Resistance: | 300 millohm at 2 ADC |
| Isolation | |
| Open Channel, Channel-Channel: | $>10^{11}$ohm |
| Channel-Chassis: | $>10^{10}$ ohm |
| High-Low: | $>10^{11}$ohm |

### AC Performance

| | |
|---|---|
| Capacitance | |
| Open Channel: | <10 pF |
| Channel-Channel: | <10 pF |
| Channel-Chassis: | <125 pF |
| High-Low: | <20 pF |
| Bandwidth (-3dB): | 20 MHz (50 ohm termination) |
| Insertion Loss (50 Ohm Termination) | |
| 100 kHz: | <0.20 dB |
| 1 MHz: | <0.25 dB |
| 10 MHz: | <1.50 dB |
| Cross Talk (50 Ohm Termination) | |
| 100 kHz: | -70dB |
| 1 MHz: | -55 dB |
| 10 MHz: | -36dB |
| Switching Time: | 10 mSec per channel |

### 1.4.9 Option 1250-35

1.4.9.1 The 1250-35 Scanner / Multiplexer Module is a user configurable switching module that may be configured in eight different configurations for use at frequencies up to 3 MHz. These are :

1) Eight 1 x 6 two wire scanner / multiplexers

2) Four 1 x 6 four-wire scanner / multiplexers

3) Four 1 x 12 two-wire scanner / multiplexers

4) Two 1 x 12 four wire scanner / multiplexers

5) Two 1 x 24 two-wire scanner / multiplexers

6) One 1 x 24 four-wire scanner / multiplexers

7) One 1 x 48 two-wire scanner / multiplexers

8) One 1 x 96 one-wire scanner / multiplexer

Refer to the section on 1250-35 Module Specific Syntax in Section 3 for instructions on how to select the 1250-35 configuration.

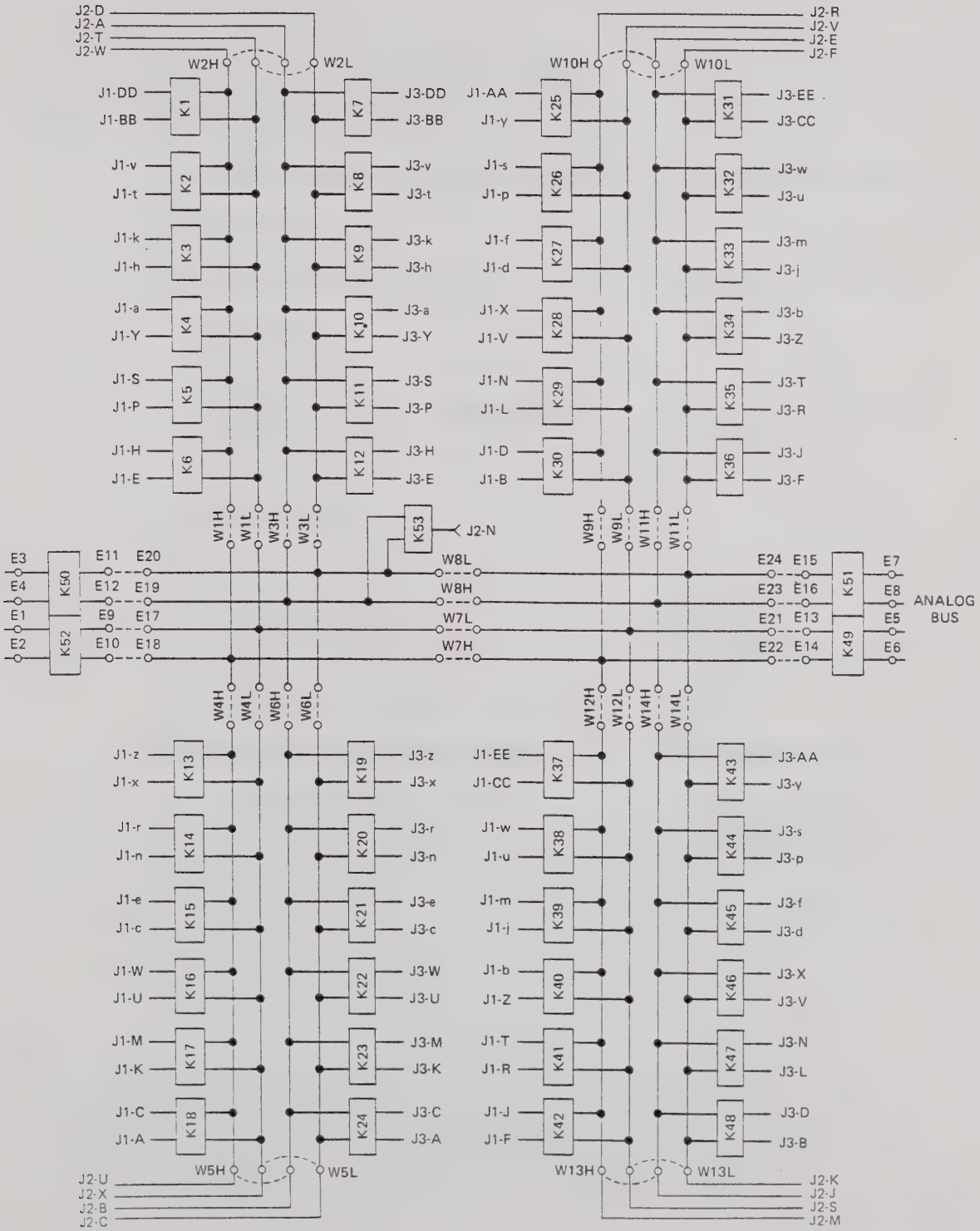
In most of the above configurations the 1250-35 may be user configured to access the 1250 Analog bus. The Analog bus allows internal expansion for the configuration of larger scanner / multiplexers than the 1250-35 may achieve alone.

* The 3 MHz bandwidth specified for the 1250-35 is a worst-case specification. Unterminated stubs on the signal paths are the cause of the band-limiting effects that reduce the bandwidth to 3 MHz. The 1250-35 is useable above 3 MHz in the other configurations available.

**NOTE**

The 1250-35 is supported by 1250 operating systems at rev. Levels 14.1 And above.

# 1250-35 Inputs and Outputs



**Specifications**

| | |
|---|---|
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 110 VDC, 125 VAC RMS |
| Maximum Switchable Current per channel: | 1 A DC or rms |
| Maximum Switchable Power per channel: | 30 W DC, 62.5 VA AC |

**DC Performance**

| | |
|---|---|
| Differential Thermal Offset: | ≤ 4 $\mu$V per channel, |
| Path Resistance: | ≤ 1 Ω |
| Isolation | |
| Open Channel, channel-channel: | > $5x10^8$ Ω |
| Channel-Chassis: | > $5x10^8$ Ω |
| Hi-Lo: | > $5x10^8$ Ω |

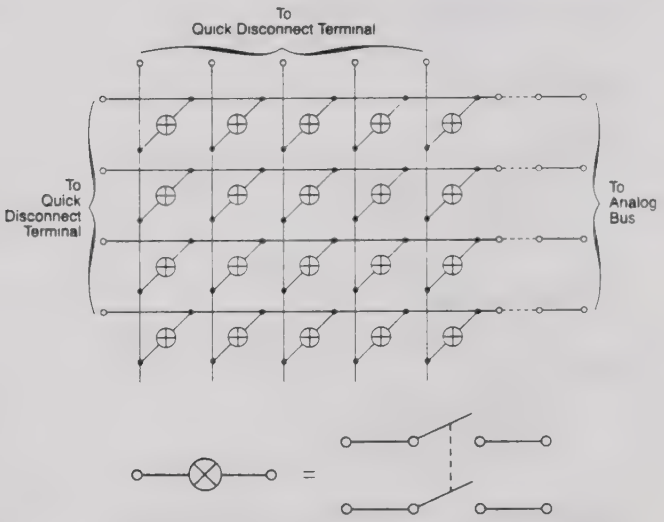
**AC Performance**

| | |
|---|---|
| Capacitance | |
| Open Channel: | <5 pF |
| Channel-Channel: | <10 pF |
| Channel-Chassis: | <100 pF |
| Bandwidth, (-3 dB, 50 ohm termination): | 30 Mhz |
| Insertion Loss, (50 ohm termination): | <.25 dB at 1 MHz |
| Crosstalk, (50 ohm termination): | <-90 dB at 10 kHz<br><-70 dB at 100 kHz<br><-50 dB at 1 MHz |
| Switching Time: | ≤ 2 ms / channel (typical) |

## 1.4.10 Option 1250-40

### Description

The 1250-40 Matrix Module supplies a two wire 4x5 signal switching matrix for use at up to 10 MHz*. The Analog bus allows internal expansion for the configuration of matrices of up to 4x25. Relay contacts are monitored to provide user selectable confidence checking.




* The 10 MHz bandwidth specified for the 1250-40 is a worst-case specification. Unterminated stubs on the matrix signal paths are the cause of the band-limiting effects that reduce the 1250-40 bandwidth to 10 MHz. Choosing the longest path length possible for a signal will reduce the length of these unterminated stubs and also reduces the band limiting effects that they cause. This allows the 1250-40 to be used above 10 MHz.

NOTE

The 1250-40 has been superceded by the 1250-40B. It is still available to users with systems configured to use the 1250-40, however, as the pin configuration used by the 1250-40B is different from that of the 1250-40.

**Specifications**

| | |
|---|---|
| Switch Configuration: | 4x5 two wire matrix |
| User Connector: | Quick Disconnect screw terminal |
| Maximum Switchable Voltage: | 250 VDC, 250 VAC RMS or 350 VAC pk |
| Maximum Switchable Current (DC or AC rms): | |
| Per Channel: | 2 A |
| Per Module: | 8 A |
| Maximum Switchable Power | |
| Per channel: | 60 W DC, 500 VA AC |
| Per module: | 240 W DC, 2000 VA AC |

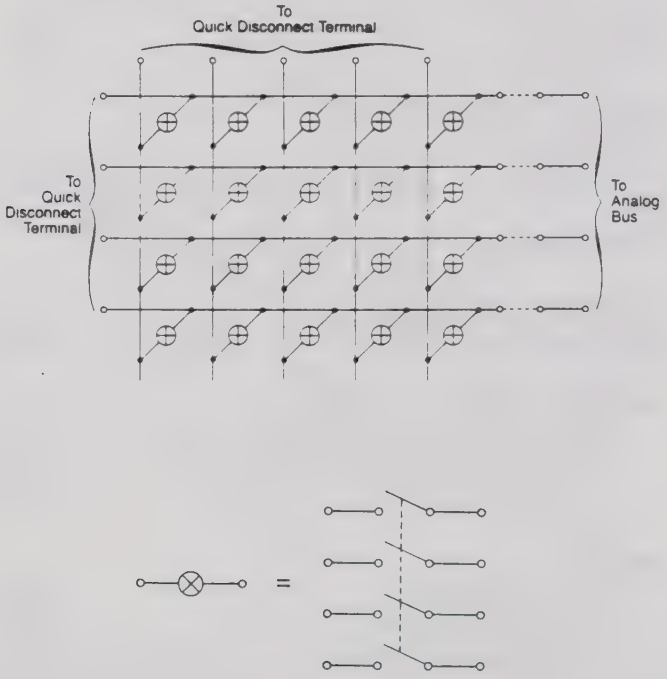
DC Performance

| | |
|---|---|
| Differential Thermal Offset: | $\leq 3\ \mu V$ per channel |
| Path Resistance: | 300 milliohm at 2A DC |
| Isolation at 40 °C, 50 % RH | |
| Open Channel, channel-channel: | $>10^{10}$ ohms |
| Channel-Chassis: | $>10^{10}$ ohms |
| Hi-Lo: | $>10^{10}$ ohms |
| Capacitance | |
| Open Channel: | <10 pF |
| Channel-Channel: | <10 pF |
| Channel-Chassis: | <75 pF |
| Hi-Lo: | <15 pF |
| Bandwidth, (-3 dB, 50 ohm termination): | 10 Mhz |
| Insertion Loss, 50 ohm termination: | <.20 dB at 100 kHz<br><.30 dB at 1 MHz<br><3.00 dB at 10 MHz |
| Crosstalk, 50 ohm termination: | <-70 dB at 100 kHz<br><-50 dB at 1 MHz<br><-30 dB at 10 MHz |
| Switching Time: | 10 ms / channel |

## 1.4.11 Option 1250-40B

### Description

The 1250-40B supplies a four wire 4x5 signal switching matrix for use at up to 10 MHz*. Relay coil currents are monitored to provide user selectable confidence checking. Access to the analog bus is provided by the addition of jumper wires.




* The 10 MHz bandwidth specified for the 1250-40B is a worst-case specification. Unterminated stubs on the matrix signal paths are the cause of the band-limiting effects that reduce the 1250-40B bandwidth to 10 MHz. Choosing the longest path length possible for a signal will reduce the length of these unterminated stubs and also reduces the band limiting effects that

they cause. This allows the 1250-40B to be used above 10 MHz.

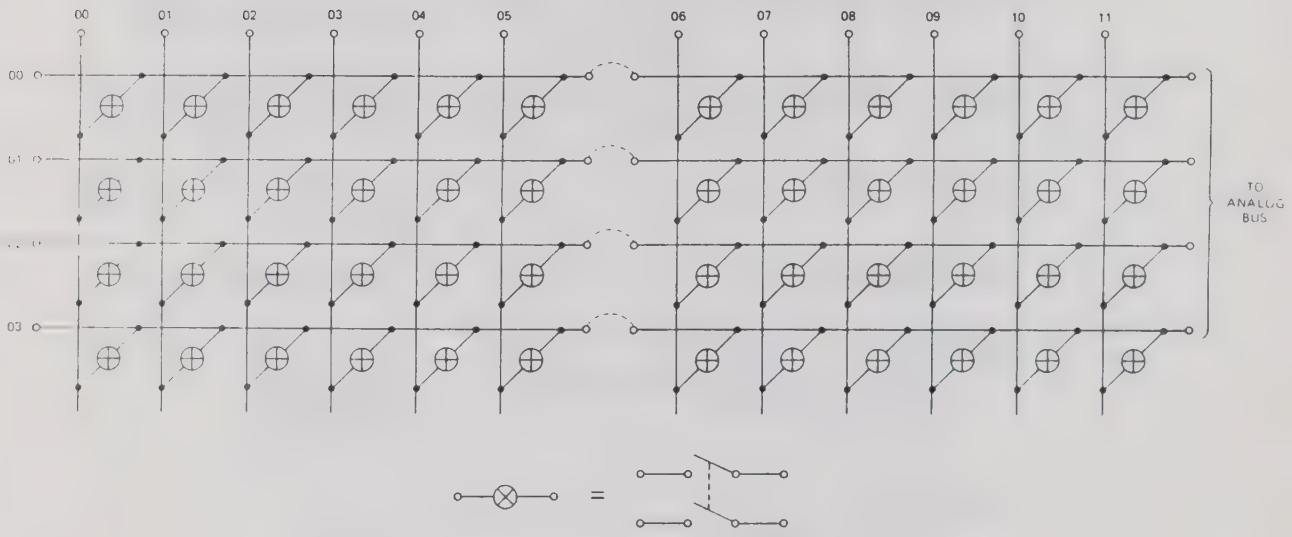
**Specifications**

| | |
|---|---|
| User Connector: | Quick Disconnect screw terminal |
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 250 VDC, 250 VAC RMS and 350 VAC pk |
| Maximum Switchable Current per channel: | 2 A DC, 2A AC RMS |
| per module: | 8 A DC, 8A AC RMS |
| Maximum Switchable Power per channel: | 60 W DC, 500 VA AC |
| per module: | 240 W DC, 2000 VA AC |
| Thermal Offset: | < 3uV per channel, differential |
| Path Resistance: | 300 milliohm at 2A DC |
| Isolation | |
| Open Channel, channel-channel: | $>10^{10}$ ohms |
| Channel-Chassis: | $>10^{10}$ ohms |
| Hi-Lo: | $>10^{10}$ ohms |
| Capacitance | |
| Open Channel: | <10 pF |
| Channel-Channel: | <10 pF |
| Channel-Chassis: | <75 pF |
| Hi-Lo: | <15 pF |
| Bandwidth, 50 ohm termination: | 10 Mhz |
| Insertion Loss, 50 ohm termination: | <.20 dB at 100 kHz<br><.30 dB at 1 MHz<br><3.00 dB at 10 MHz |
| Crosstalk, 50 ohm termination: | <-70 dB at 100 kHz<br><-45 dB at 1 MHz<br><-30 dB at 10 MHz |
| Switching Time: | 10 ms |

## 1.4.12 Option 1250-45

### Description

The 1250-45 supplies a two wire 4x12 signal switching matrix or it may be configured in the factory as two 4x6 matrices, for use at up to 10 MHz. Relay coil currents are monitored to provide user selectable confidence checking.




**NOTE**

The 1250-45 is not supported by 1250 operating systems at rev. levels 13.1 or lower. To introduce the 1250-45 into a 1250 system at a lower operating system rev. level than 13.1, contact Racal-Dana for details of the software upgrade required.

* The 10 MHz bandwidth specified for the 1250-45 is a worst-case specification. Unterminated stubs on the matrix signal paths are the cause of the band-limiting effects that reduce the 1250-45 bandwidth to 10 MHz. Choosing the longest path length possible for a signal will reduce the length of these unterminated stubs and also reduces the band limiting effects that they cause. This allows the 1250-45 to be used above 10 MHz.

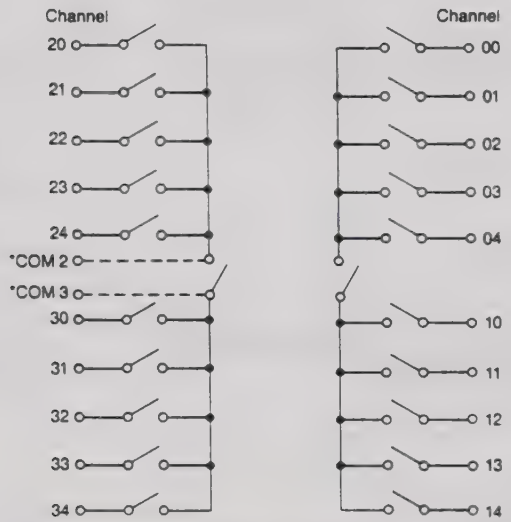
**Specifications**

| | |
|---|---|
| User Connector: | Quick Disconnect screw terminal |
| Maximum Switchable Voltage (Terminal-Terminal or Terminal-Chassis): | 220 VDC, 250 VAC RMS and 350 VAC pk |
| Maximum Switchable Current per channel: | 2 A DC, 2A AC RMS |
| per module: | 8 A DC, 8A AC RMS |
| Maximum Switchable Power per channel: | 60 W DC, 125 VA AC |
| per module: | 240 W DC, 500 VA AC |
| Thermal Offset: | < 3uV per channel, differential |
| Path Resistance: | 300 milliohm at 2A DC |
| Isolation | |
| Open Channel, channel-channel: | $>10^{10}$ ohms |
| Channel-Chassis: | $>10^{10}$ ohms |
| Hi-Lo: | $>10^{10}$ ohms |
| Capacitance | |
| Open Channel: | <80 pF |
| Channel-Channel: | <30 pF |
| Channel-Chassis: | <200 pF |
| Hi-Lo: | <100 pF |
| Bandwidth, 50 ohm termination: | 10 Mhz |
| Insertion Loss, 50 ohm termination: | <.20 dB at 100 kHz<br><.30 dB at 1 MHz<br><3.00 dB at 10 MHz |
| Crosstalk, 50 ohm termination: | <-70 dB at 100 kHz<br><-45 dB at 1 MHz<br><-25 dB at 10 MHz |
| Switching Time: | 10 ms |

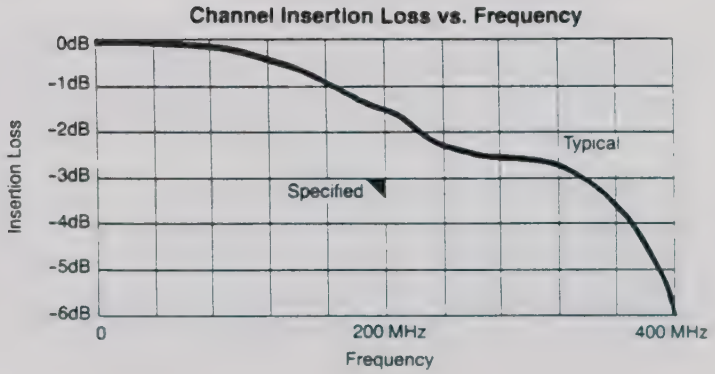
## 1.4.13 Option 1250-50

### Description

The 1250-50 RF Multiplexer Module provides four 1x4, two 1x9 or one 1x17 multiplexers for use at up to 200 MHz. The addition of user installable BNC connectors allows two 1x5 and two 1x4, one 1x10 and one 1x9 and one 1x19 multiplexers to be configured. Relay contacts are monitored to provide user selectable confidence checking.




**Model 1250-50**
*Requires an additional connector.



**Specifications**

| | |
|---|---|
| User Connector: | BNC Plug |
| Maximum Switchable Voltage<br>Signal - Signal Ground: | 200 VDC, 200 VAC pk |
| Maximum Switchable Current Per Channel: | 5 A DC, 1 A AC pk |
| Maximum Switchable Power: | 10 W DC, 10 VA, 10 W RF into 50 Ω |

**DC Performance**

| | |
|---|---|
| Path Resistance: | ≤ 500 milliohm |

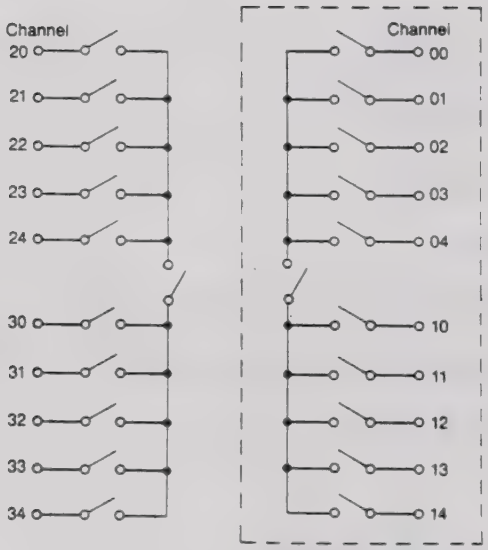
**AC Performance**

| | |
|---|---|
| Impedance: | 50 Ω |
| Bandwidth, (-3 dB, 50 ohm termination): | 200 MHz |
| Insertion Loss, 50 ohm termination: | 0.5 dB typical at 100 MHz |
| Crosstalk, 50 ohm termination: | <-75 dB at 10 MHz<br><-55 dB at 100 MHz<br><-50 dB at 200 MHz |
| Isolation ( 50 Ω termination) | |
| 10 MHz: | ≤ -55 dB |
| 100 MHz | ≤ -40 dB |
| 200 MHz | ≤ -35 dB |
| VSWR (50 Ω termination) | ≤ 1.5 : 1 at 100 MHz |
| Switching Time: | ≤ 2 ms |

## 1.4.14 Options 1250-51A and 1250-51B

### Description

The 1250-51A RF Multiplexer Module supplies two 1x4 or one 1x9 multiplexers for use at up to 500 MHz. The 1250-51B supplies four 1x4, two 1x9 or one 1x17 multiplexers and is also for use at up to 500 MHz. Relay coil currents are monitored to provide user selectable confidence checking.

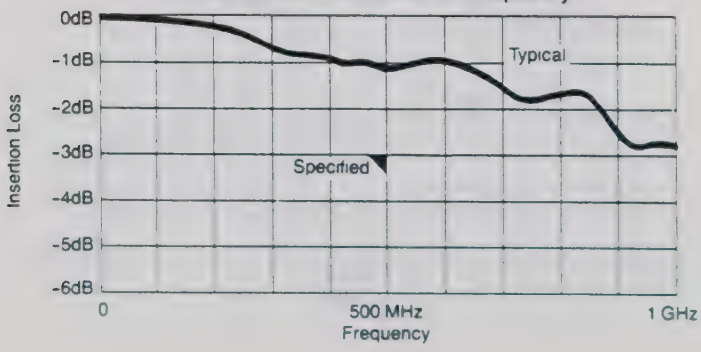



**Model 1250-51A**

**Model 1250-51A uses channels 00-14 only.**

**Model 1250-51B**

**Channel Insertion Loss vs. Frequency**



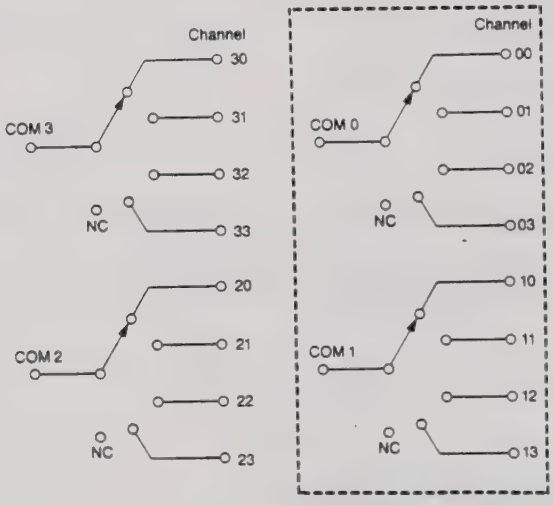
**Specifications**

| | |
|---|---|
| User Connector: | BNC |
| Maximum Switchable Voltage Signal - Signal Ground: | 30 VDC, 100 VAC rms |
| Maximum Switchable Current Per Channel: | 2 A DC, 2 A rms |
| Maximum Switchable Power Per Channel: | 60 W DC, 60 VA, 60 W RF into 50 Ω |
| Maximum Voltage, Signal Ground to Chassis: | 52 V DC or peak AC |
| **DC Performance** | |
| Path Resistance: | ≤ 600 milliohm at 2 A |
| **AC Performance** | |
| Impedance: | 50 Ω |
| Bandwidth, (-3 dB, 50 ohm termination): | 500 MHz |
| Insertion Loss, 50 ohm termination: | < 0.5 dB at 100 MHz,<br>< 1.0 dB at 250 MHz |
| Crosstalk, 50 ohm termination: | <-100 dB at 10 MHz<br><-90 dB at 100 MHz<br><-60 dB at 500 MHz |
| Isolation ( 50 Ω termination) | ≤ -70 dB at 10 MHz<br>≤ -60 dB at 100 MHz<br>≤ -50 dB at 500 MHz |
| VSWR (50 Ω termination) | 1.2 : 1 at 100 MHz |
| Switching Time: | ≤ 10 ms |

## 1.4.15 Options 1250-52A and 1250-52B

### Description

The 1250-52A Multiplexer Module provides two 1x4 multiplexers for use at up to 1 GHz. The 1250-52B Multiplexer Module provides four 1x4 multiplexers for use at up to 1 GHz. Binary tree configurations are employed to avoid unterminated stub effects that would otherwise limit the bandwidth of the modules signal paths. Unused paths are isolated and grounded to reduce the effects of radiated and conducted noise. Relay coil currents are monitored to provide user selectable confidence checking.

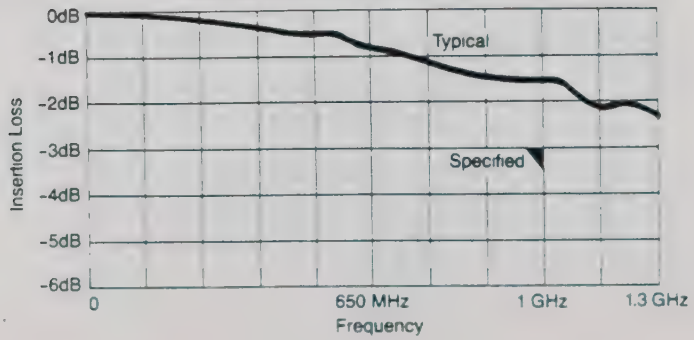



**1250-52A**

**Model 1250-52A uses channels 00-13 only.**

**Model 1250-52B**

**Channel Insertion Loss vs. Frequency**



**Specifications**

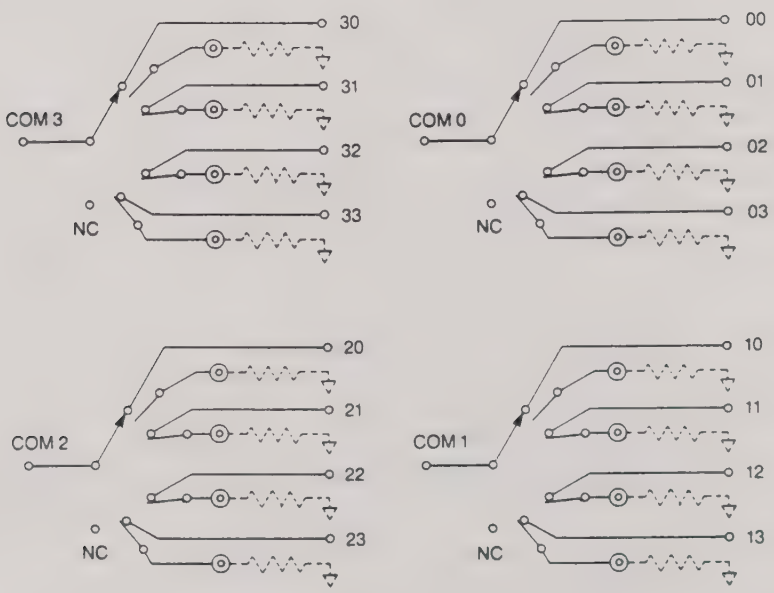
| | |
|---|---|
| User Connector: | BNC |
| Maximum Switchable Voltage Signal - Ground: | 30 VDC, 100 VAC rms |
| Maximum Switchable Current Per Channel: | 2 A DC, 2 A rms |
| Maximum Switchable Power Per Channel: | 60 W DC, 60 VA, 60 W RF power |
| Maximum Voltage, Signal Ground to Chassis: | 42 V DC or peak AC |
| **DC Performance** | |
| Path Resistance: | 500 milliohm at 2 A |
| **AC Performance** | |
| Impedance: | 50 Ω |
| Bandwidth, (-3 dB, 50 ohm termination): | 1 GHz |
| Insertion Loss, (50 Ω termination): | 0.5 dB at 100 MHz,<br>1.0 dB at 500 MHz |
| Crosstalk, (50 Ω termination): | <-100 dB at 10 MHz<br><-95 dB at 100 MHz<br><-55 dB at 1 GHz |
| Isolation (50 Ω termination): | ≤ -100 dB at 10 MHz<br>≤ -90 dB at 100 MHz<br>≤ -55 dB at 1 GHz |
| VSWR (50 Ω termination) | 1.4 : 1 at 500 MHz |
| Switching Time: | ≤ 10 ms |

## 1.4.16 Option 1250-54B

### Description

The 1250-54B supplies four 4:1 multiplexers for use at up to 1 GHz. Any unused inputs may be terminated into 50 ohms. Binary tree configurations are employed to avoid unterminated stub effects that would otherwise limit the bandwidth of the modules signal paths. Relay coil currents are monitored to provide user selectable confidence checking.

Note: A version of the 1250-54B with a characteristic impedance of 75 Ω is available and is designated the 1250-55B.



**Specifications**

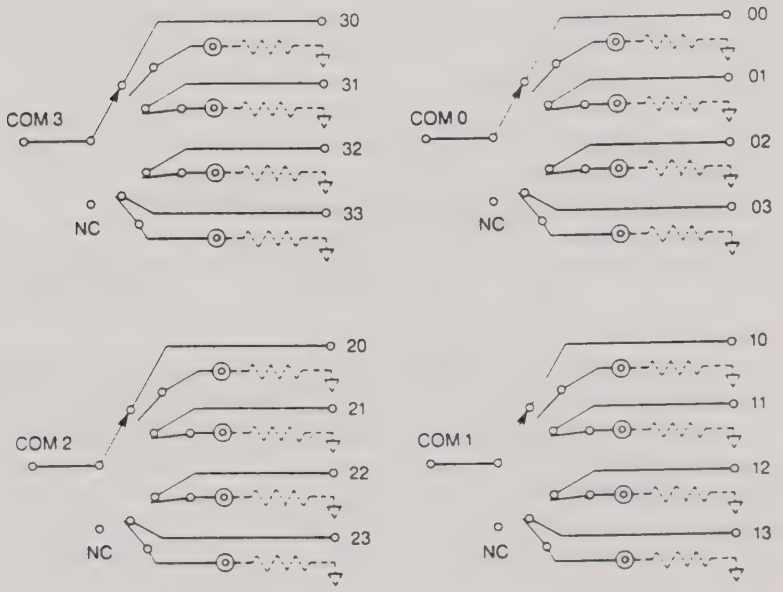
| | |
|---|---|
| User Connector: | BNC |
| Maximum Switchable Voltage (Signal - Ground): | 30 VDC, 100 VAC rms |
| Maximum Switchable Current: | 2 A DC or AC rms |
| Maximum Switchable Power: | 60 WDC, 600 VA, 60 W RF Power |
| Maximum Voltage (Signal Ground - Chassis): | 42 VDC or peak AC |
| **DC Performance** | |
| Path Resistance: | 500 mΩ at 2 ADC |
| **AC Performance** | |
| Impedance: | 50 Ω |
| Bandwidth (-3 dB, 50 Ω termination): | 1 GHz |
| Insertion Loss (50 Ω termination): | 0.5 dB at 100 MHz<br>1.0 dB at 500 MHz |
| Crosstalk (50 Ω termination): | ≤ -100 dB at 10 MHz<br>≤ -85 dB at 100 MHz<br>≤ -55 dB at 1 GHz |
| Isolation: (50 Ω termination) | ≤ -100 dB at 10 MHz<br>≤ -80 dB at 100 MHz<br>≤ -55 dB at 1 GHz |
| VSWR: (50 Ω termination) | 1.4 : 1 at 500 MHz |
| Switching Time: | ≤ 10 mSec |

## 1.4.17 Option 1250-55B

### Description

The 1250-55B supplies four 4:1 multiplexers for use at up to 1 GHz. Any unused inputs may be terminated into 50 ohms. Binary tree configurations are employed to avoid unterminated stub effects that would otherwise limit the bandwidth of the modules signal paths. Relay coil currents are monitored to provide user selectable confidence checking.

Note: A version of the 1250-55B with a characteristic impedance of 50 Ω is available and is designated the 1250-54B.



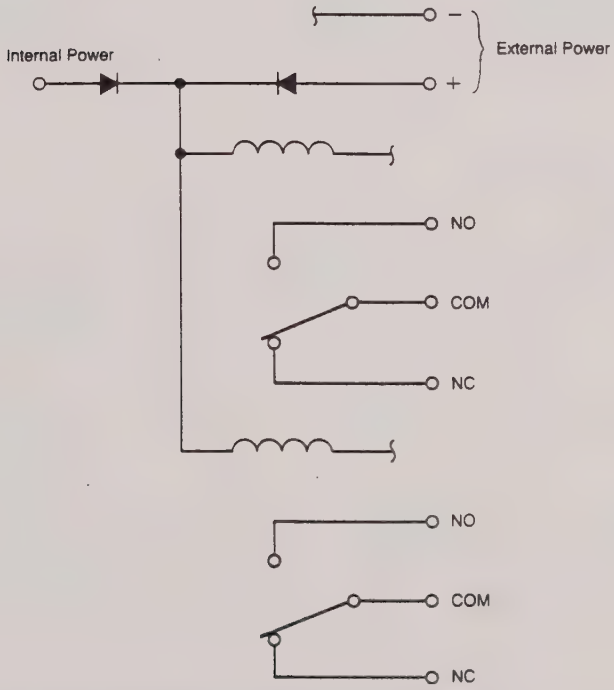
**Specifications**

| | |
|---|---|
| User Connector: | BNC |
| Maximum Switchable Voltage (Signal - Ground): | 30 VDC, 100 VAC rms |
| Maximum Switchable Current: | 2 A DC or AC rms |
| Maximum Switchable Power: | 60 WDC, 600 VA, 60 W RF Power |
| Maximum Voltage (Signal Ground - Chassis): | 42 VDC or peak AC |
| **DC Performance** | |
| Path Resistance: | 500 mΩ at 2 ADC |
| **AC Performance** | |
| Impedance: | 50 Ω |
| Bandwidth (-3 dB, 50 Ω termination): | 1 GHz |
| Insertion Loss (50 Ω termination): | 0.5 dB at 100 MHz<br>1.0 dB at 500 MHz |
| Crosstalk (50 Ω termination): | ≤ -100 dB at 10 MHz<br>≤ -85 dB at 100 MHz<br>≤ -55 dB at 1 GHz |
| Isolation: (50 Ω termination) | ≤ -100 dB at 10 MHz<br>≤ -80 dB at 100 MHz<br>≤ -55 dB at 1 GHz |
| VSWR: (50 Ω termination) | 1.4 : 1 at 500 MHz |
| Switching Time: | ≤ 10 mSec |

## 1.4.18 Options 1250-60 and 1250-61

### Description

The 1250-60 and 1250-61 Microwave Switch modules provide up to four SPDT coaxial switches per module. The 1250-60 is for use at up to 18 GHz and the 1250-61 is for use at up to 26.5 GHz. The A version of these switch modules provides two SPDT relays per module and the B version provides four SPDT relays per module. Relay coil currents are monitored to provide user selectable confidence checking.




**Model 1250-60A/61A microwave switch and power supply configuration. Model 1250-60B/61B contains four relays.**

**Specifications**

| | | | |
|---|---|---|---|
| Maximum Voltage | | 71 VAC rms | |
| Maximum Current Per Channel: | | 1.4 A rms | |
| Maximum Power Per Channel: | | 1250-60 | 1250-61 |
| | 100 MHz | 100 W | 250 W |
| | 1 GHz | 50 W | 80 W |
| | 10 GHz | 10 W | 25 W |
| | 18 GHz | 7.5 W | 20 W |
| | 26.5 GHz | — | 25 W |
| Switching Time (18 GHz): | | ≤ 30 msec | |
| (26.5 GHz) | | ≤ 15 msec | |

**AC Performance**

**1250-60**

| | |
|---|---|
| Insertion Loss, (50 Ω termination): | 0.2 dB to 6 GHz<br>0.4 dB to 12.4 GHz<br>0.5 dB to 18 GHz |
| Isolation (50 Ω termination): | ≤ -70 dB at 6 GHz<br>≤ -60 dB at 12.4 GHz<br>≤ -60 dB at 18 GHz |
| VSWR (50 Ω termination) | 1.25 : 1 to 6 GHz<br>1.4 : 1 to 12.4 GHz<br>1.5 : 1 to 18 GHz |

**1250-61**

| | |
|---|---|
| Insertion Loss, (50 Ω termination): | 0.1 dB at 4 GHz<br>0.2 dB at 12.4 GHz<br>0.3 dB at 18 GHz<br>1.0 dB at 26.5 GHz |
| Isolation (50 Ω termination): | ≤ -80 dB at 4 GHz<br>≤ -70 dB at 12.4 GHz<br>≤ -60 dB at 18 GHz<br>≤ -40 dB at 26.5 GHz |
| VSWR (50 Ω termination) | 1.2 : 1 to 4 GHz<br>1.3 : 1 to 12.4 GHz<br>1.5 : 1 to 18 GHz<br>1.65 : 1 to 26.5 GHz |

# SECTION 2 INSTALLATION

## 2.1 Introduction

2.1.1 This section describes the unpacking and inspection, reshipment, preparation for use, plug-in modules, General Purpose Interface Bus (GPIB), equipment rack installation, Option 90 Intelligent Front Panel installation, storage/temperature, and ventilation requirements for the 1250.

## 2.2 Unpacking and Inspection

2.2.1 Before unpacking the 1250, check the exterior of the shipping carton for any signs of damage. All irregularities should be noted on the shipping bill. Remove the instrument from its carton, preserving the factory packaging as much as possible. Inspect the 1250 for any defect or damage. Notify the carrier immediately if any damage is apparent. Have a qualified person check the instrument for safety before use.

## 2.3 Reshipment Instructions

2.3.1 Use the original packaging if it is necessary to return the 1250 to Racal-Dana for servicing. The original shipping carton and the instrument's plastic-foam form will provide the necessary support for safe reshipment. If the original packaging is unavailable, reconstruct it as much as possible. Wrap the 1250 in plastic; then use plastic spray foam to surround and protect the instrument. Reship in either the original or new, sturdy shipping carton.

## 2.4 Preparation for use

### 2.4.1 Power Connections

2.4.1.1 Before operating the 1250, verify that the AC voltage selector is correctly set for the local AC supply. The 1250 operates on 100, 120, 220, or 240 volts, 50 to 60 Hz (or 100 and 120 volts on the 50 to 440 Hz version). The present voltage range in use can be seen through the small window in the power input module on the rear panel.

## 2.4.2 Line Voltage Selection

2.4.2.1 The line voltage setting is easily changed by repositioning the small voltage selector card in its slot. Refer to Figure 2.1 and use the following procedure:

a. Remove the power cord from the power input module

b. Fully slide the transparent fuse cover to the left. This exposes the fuse and voltage selector card

c. Pull the small lever marked FUSE PULL completely to the left. This ejects the fuse from its holder, permitting access to the selector card

d. Remove the selector card, then reposition it in its slot so that the desired line voltage designation is visible. (Using a small pair of needle-nose pliers can be helpful in completing this step.)

e. Pull the lever completely back to the right, snapping it closed

f. Replace the fuse in its holder. Line voltage settings of 100 or 120V should have a 1.5A (.75 on the 50-440 Hz version) Slow-Blow fuse installed; settings of 220 or 240A should have a .75V (.375A on the 50-440 Hz version) Slow-Blow fuse installed

g. Slide the fuse cover completely to the right covering the voltage selector card and fuse. The correct line voltage designation should be visible through the window

h. Connect the power cord to the 1250 again

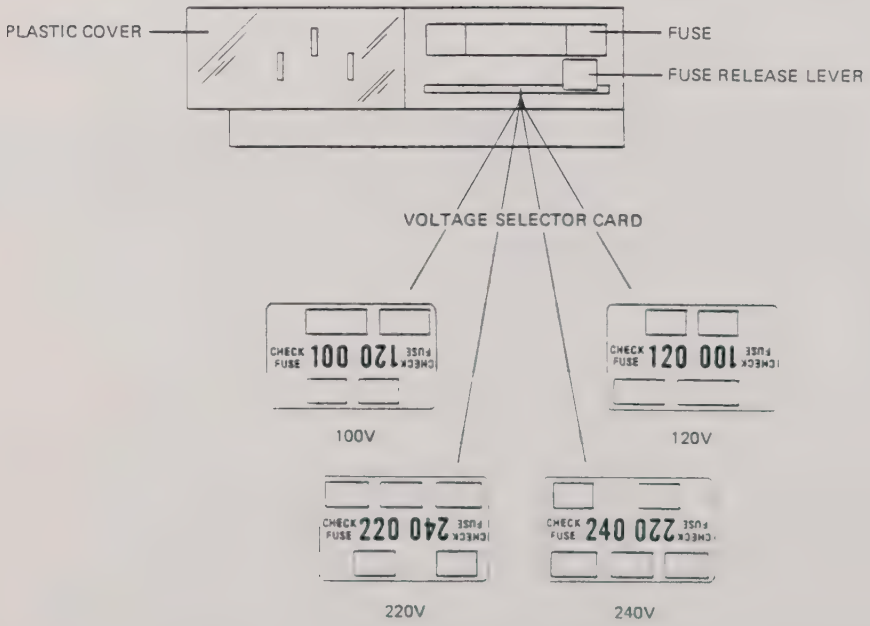



Figure 2.1 - AC Line Voltage Selection

### 2.4.3 Power Cord and Grounding

2.4.3.1 The 1250 is grounded in accordance with MIL-T-28800C, protecting the user from possible injury due to shorted circuits.

2.4.3.2 A protective ground terminal, forming part of the rear-panel input socket, is provided. The 1250 is supplied with a detachable 3-core power cord. Only this cord should be used.

2.4.3.3 Use only AC power outlets having a protective ground for connection to the 1250. **DO NOT USE** 2-core extension cords or 3-prong to 2-prong adaptors that don't provide a protective ground connection. Connection of the power cord to the power outlet must be made in accordance with the following standard color code:

| | American | European |
|---|---|---|
| Live | Black | Brown |
| Neutral | White | Blue |
| Ground (Earth) | Green | Green/Yellow |

2.4.3.4 All devices connected to or in proximity with the 1250 must maintain the third-wire ground (earth) intact.

## 2.5 1250 Series Plug-in Modules

### 2.5.1 Switch modules

2.5.1.1 Up to five user-selected plug-in modules can be placed in the 1250. Modules measure approximately 9 in. Wide x 10 in. Deep x 1 in. Thick and are polarized, along with the card cage, to prevent any module from being installed upside-down. By use of card guides, 1250 modules are easily installed and extracted from the card cage. All plug-in modules provide for a maximum component height of 0.625 in. Basic modules are designed to provide high-voltage shielding on the top, bottom, and sides (1000V max.; max. component height of 0.4 in).

### 2.5.2 Switching Module Installation

2.5.2.1 Each of the five plug-in switch modules is easily installed, using its corresponding card guides, into the rear of the 1250 mainframe as shown in Figure 2-2. Modules may be removed without the need for desoldering or removing the mainframe from the system. At installation, ensure that the front of the plug-in module is securely connected to the Analog and Interconnect Buses using their respective connectors and plugs at P2 and P1.

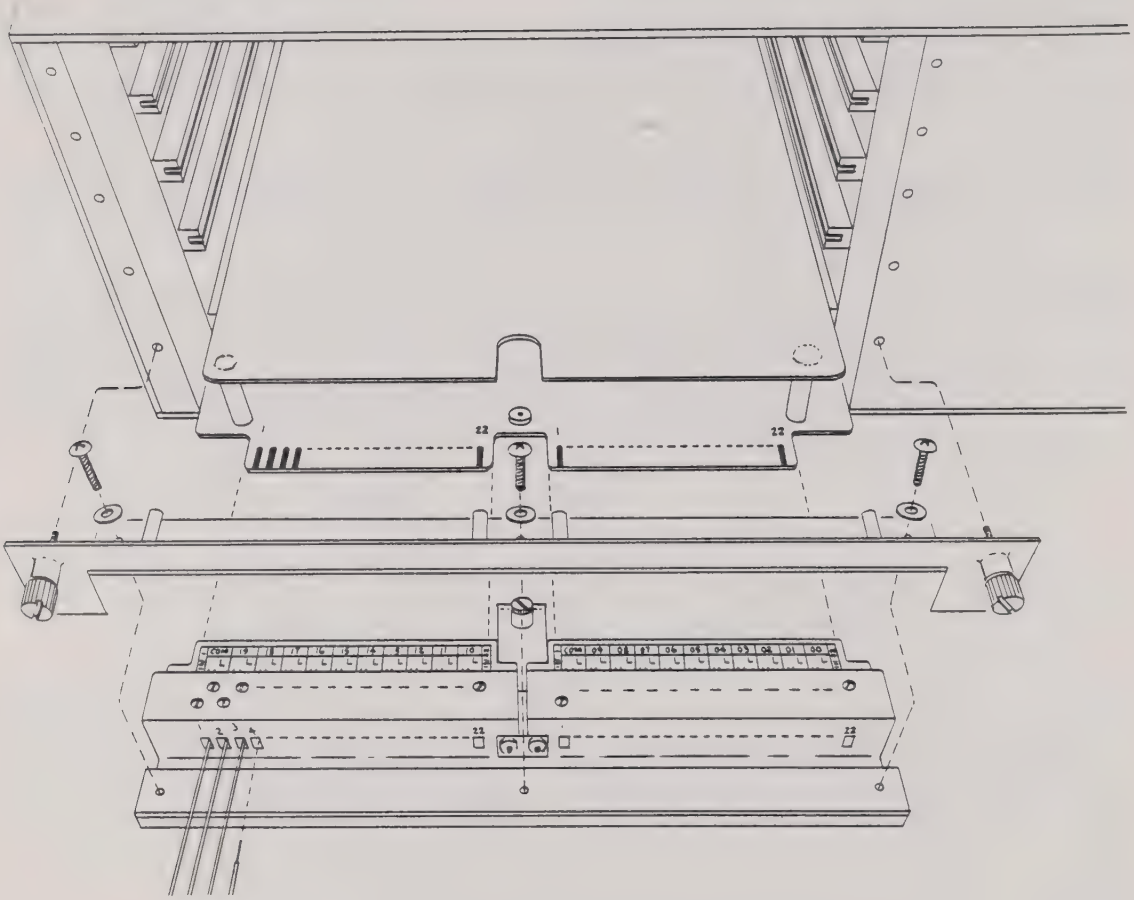


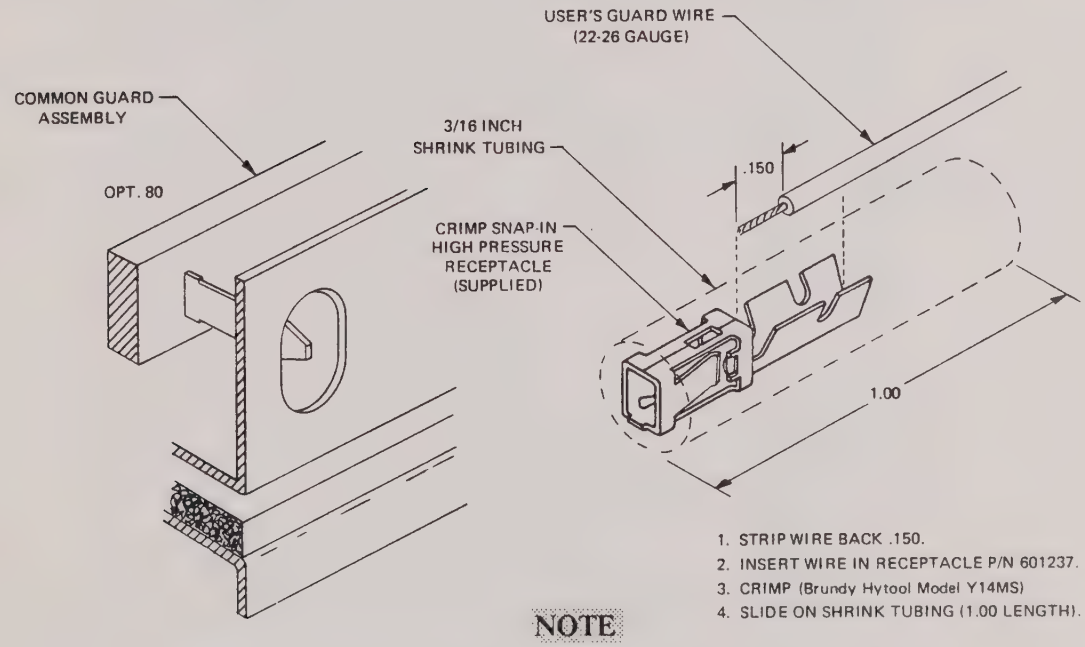
**Figure 2-2 - 1250 Switching Module Installation Showing Use of Quick-Release Disconnector (common guard assembly not shown in the figure and not supplied with all models)**

### 2.5.3 Strain Relief Screw Terminals

2.5.3.1 All low-frequency switch modules, like the 1250-30 Scanner/Multiplexer module, have special screw terminal blocks which incorporate strain-relief cable supports. Again refer to Figure 2-2 showing these features. The terminal blocks are attached to the module with gold-plated edge connectors secured with a rapid-release screw. The user may either remove only the terminal block assembly or the entire module with attached terminal block from the 1250 mainframe. The terminal block assembly has a quick-release feature (using two slotted fast-operating screws) which permits rapid

connection/disconnection of terminal blocks from the 1250 mainframe. Terminal block assemblies may be pre-wired (loosen and remove the three screws shown in the figure) for easy interchange on any of the plug-in modules. To complete cabling, insert the stripped wires into the appropriate connector holes (as shown) and retighten the corresponding screws. Ensure that each wire is positioned evenly between the two sections of the strain-relief support.

2.5.3.2 If the user's signal shields must be commoned, the common guard assembly may be used. Terminate the drain (guard) wires to the connector as shown in Figure 2-3 below. The connectors are supplied with the Option 80.




**NOTE**

The Common guard assembly is not supplied with all models

**Figure 2-3 - 1250 Option 80 Guard Connection Procedure**

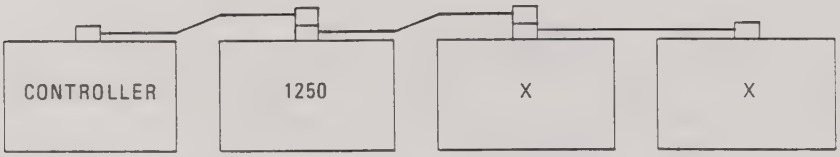
## 2.6 GPIB interface

### 2.6.1 GPIB Bus Organization

2.6.1.1 Shown below in Figure 2-4A and B are the linear and cluster bus organizations possible for the 1250/GPIB.

A

Linear Bus Organization




B

Cluster Bus Organization

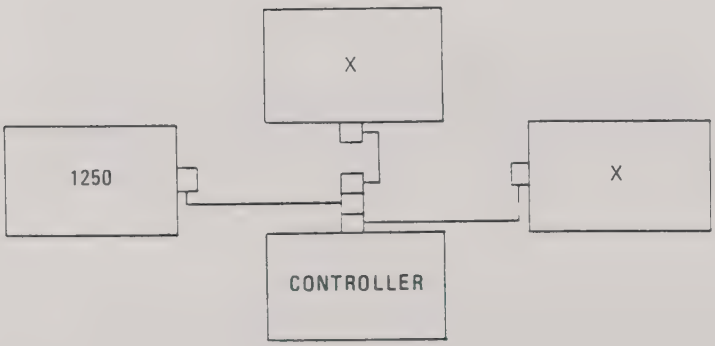
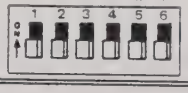
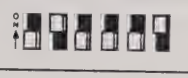
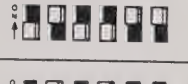
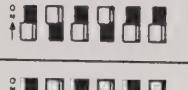
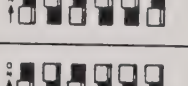
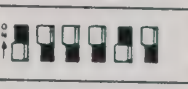



**Figure 2-4 - Linear (A) and Cluster (B) Bus Organizations**

| ASCII CHARACTERS | | DATA LINES | | | | | | | ADDRESS SWITCH SETTING | DECIMAL ADDRESS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $D_7$ | $D_6$ | $D_5$ | $D_4$ | $D_3$ | $D_2$ | $D_1$ | A A A A A<br>5 4 3 2 1 | |
| TALK | LISTEN | TALK | LISTEN | ADDRESS | | | | | 1 / 0 | |
| | | | | 16 | 8 | 4 | 2 | 1 | | |
| | SP | 0 | 1 | 0 | 0 | 0 | 0 | 0 | | 00 |
| @ | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | |
| | ! | 0 | 1 | 0 | 0 | 0 | 0 | 1 | | 01 |
| A | | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | |
| | " | 0 | 1 | 0 | 0 | 0 | 1 | 0 | | 02 |
| B | | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | |
| | # | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 03 |
| C | | 1 | 0 | 0 | 0 | 0 | 1 | 1 | | |
| | $ | 0 | 1 | 0 | 0 | 1 | 0 | 0 | | 04 |
| D | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | | |
| | % | 0 | 1 | 0 | 0 | 1 | 0 | 1 | | 05 |
| E | | 1 | 0 | 0 | 0 | 1 | 0 | 1 | | |
| | & | 0 | 1 | 0 | 0 | 1 | 1 | 0 | | 06 |
| F | | 1 | 0 | 0 | 0 | 1 | 1 | 0 | | |
| | ' (APOSTROPHE) | 0 | 1 | 0 | 0 | 1 | 1 | 1 | | 07 |
| G | | 1 | 0 | 0 | 0 | 1 | 1 | 1 | | |
| | ( | 0 | 1 | 0 | 1 | 0 | 0 | 0 | | 08 |
| H | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | | |
| | ) | 0 | 1 | 0 | 1 | 0 | 0 | 1 | | 09 |
| I | | 1 | 0 | 0 | 1 | 0 | 0 | 1 | | |
| | * | 0 | 1 | 0 | 1 | 0 | 1 | 0 | | 10 |
| J | | 1 | 0 | 0 | 1 | 0 | 1 | 0 | | |
| | + | 0 | 1 | 0 | 1 | 0 | 1 | 1 | | 11 |
| K | | 1 | 0 | 0 | 1 | 0 | 1 | 1 | | |
| | , | 0 | 1 | 0 | 1 | 1 | 0 | 0 | | 12 |
| L | | 1 | 0 | 0 | 1 | 1 | 0 | 0 | | |
| | – | 0 | 1 | 0 | 1 | 1 | 0 | 1 | | 13 |
| M | | 1 | 0 | 0 | 1 | 1 | 0 | 1 | | |
| | . | 0 | 1 | 0 | 1 | 1 | 1 | 0 | | 14 |
| N | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | | |
| | / | 0 | 1 | 0 | 1 | 1 | 1 | 1 | | 15 |
| O | | 1 | 0 | 0 | 1 | 1 | 1 | 1 | | |

| ASCII CHARACTERS | | DATA LINES | | | | | | | ADDRESS SWITCH SETTING | DECIMAL ADDRESS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | $D_7$ | $D_6$ | $D_5$ | $D_4$ | $D_3$ | $D_2$ | $D_1$ | A 5 4 3 2 1 | |
| TALK | LISTEN | TALK | LISTEN | ADDRESS | | | | | | |
| | | | | 16 | 8 | 4 | 2 | 1 | | |
| | Ø | 0 | 1 | 1 | 0 | 0 | 0 | 0 |  | 16 |
| P | | 1 | 0 | 1 | 0 | 0 | 0 | 0 | | |
| | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |  | 17 |
| Q | | 1 | 0 | 1 | 0 | 0 | 0 | 1 | | |
| | 2 | 0 | 1 | 1 | 0 | 0 | 1 | 0 | | 18 |
| R | | 1 | 0 | 1 | 0 | 0 | 1 | 0 | | |
| | 3 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |  | 19 |
| S | | 1 | 0 | 1 | 0 | 0 | 1 | 1 | | |
| | 4 | 0 | 1 | 1 | 0 | 1 | 0 | 0 |  | 20 |
| T | | 1 | 0 | 1 | 0 | 1 | 0 | 0 | | |
| | 5 | 0 | 1 | 1 | 0 | 1 | 0 | 1 | | 21 |
| U | | 1 | 0 | 1 | 0 | 1 | 0 | 1 | | |
| | 6 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |  | 22 |
| V | | 1 | 0 | 1 | 0 | 1 | 1 | 0 | | |
| | 7 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | | 23 |
| W | | 1 | 0 | 1 | 0 | 1 | 1 | 1 | | |
| | 8 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | | 24 |
| X | | 1 | 0 | 1 | 1 | 0 | 0 | 0 | | |
| | 9 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | | 25 |
| Y | | 1 | 0 | 1 | 1 | 0 | 0 | 1 | | |
| | | 0 | 1 | 1 | 1 | 0 | 1 | 0 | | 26 |
| Z | | 1 | 0 | 1 | 1 | 0 | 1 | 0 | | |
| | ; | 0 | 1 | 1 | 1 | 0 | 1 | 1 | | 27 |
| [ | | 1 | 0 | 1 | 1 | 0 | 1 | 1 | | |
| | < | 0 | 1 | 1 | 1 | 1 | 0 | 0 |  | 28 |
| | | 1 | 0 | 1 | 1 | 1 | 0 | 0 | | |
| | = | 0 | 1 | 1 | 1 | 1 | 0 | 1 | | 29 |
| ] | | 1 | 0 | 1 | 1 | 1 | 0 | 1 | | |
| | > | 0 | 1 | 1 | 1 | 1 | 1 | 0 | | 30 |
| ↑ | | 1 | 0 | 1 | 1 | 1 | 1 | 0 | | |
| US | ← | ILLEGAL | | | | | | |  | 31 |

### 2.6.2 GPIB Interconnections

2.6.2.1 The GPIB system permits up to 15 instruments (including the controller) to interconnect and reside on a single bus. The GPIB cables have identical "piggyback" connectors on both ends permitting several cables to be connected to a single source. System devices and instruments may be interconnected in almost any desired configuration. There must be a path, however, from the controller to every device residing on the bus. Avoid stacking more than three or four cables on any single connector for if the stack gets too large, the force may damage the connector mounting. Be certain that each connector is firmly (finger-tight) screwed in place. Refer to Table 3.2 and associated figure for the 1250's rear-panel connections.

### 2.6.3 GPIB Cable Length Limits

2.6.3.1 If the system cabling is too long, the lines cannot be properly driven and the system will not perform correctly. It is important to ensure that the following guidelines are strictly met:

a. Total cable length for the system must be less than or equal to 65.6 feet (20 meters)

b. Total cable length for the system must be equal to or less than 6.6 feet (2 meters) times the total number of devices residing on the bus

c. Total number of instruments residing on the bus must not exceed 15

### 2.6.4 GPIB Address Assignment

2.6.4.1 The 1250 as a bus member must be assigned a unique address when operating in a GPIB system. By assigning a GPIB-Bus address to the 1250, it can be "called up" by the computer controller or another device on the bus without interfering with other units residing on the 488 bus. The coding used for setting the 1250 address is binary.

2.6.4.2 The 1250 is equipped with a rear-panel switch bank, enabling the user to assign one of 31 addresses (numbers 00 to 30).

2.6.4.3 Table 2.1 contains all the information required for setting the 1250's address and determining the talk and listen address codes used in programming the controller. Switches A1 to A5 define the listen/talk addresses for the 1250 in the addressed mode. The PWR ON SRQ, when set to 1, permits the instrument to transmit a service request to the controller when the 1250 is first powered-on.

2.6.4.4 Note in the table the column headed "ADDRESS SWITCH SETTING". It illustrates the positions of switches A1 to A5 for each number address listed in the far right column. To set the GPIB address, simply select the desired decimal address for the 1250, refer to the table, and set the switches on the address selector to the corresponding pattern in the column.

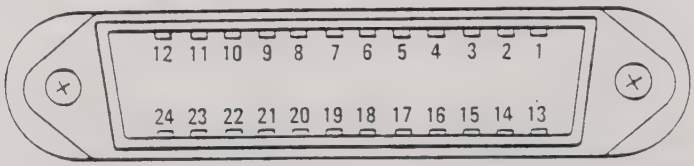
2.6.4.5 Once an address has been assigned, the controller may then address the 1250 as a talker/listener by transmitting the appropriate ASCII character on the data lines and asserting the ATN line. The "DATA LINES" column of the table shows the 7-bit binary codes for every talk/listen address assigned to the 1250. The controller transmits these codes to the 1250 to establish its talker/listener status.

2.6.4.6 Note also in the table that there are two address codes for each GPIB address number. Each code represents a different ASCII character. For example, if an address of 02 is assigned to the 1250, the talk address is the ASCII character B and the listen address is the ASCII character ". The only difference in the binary code in each case is the state of data lines D6 and D7.

2.6.4.7 The 1250 is preset at GPIB address 00 when shipped.

2.6.5 **GPIB Rear-Panel Connector**

2.6.5.1 The GPIB-Bus with its interface circuitry provides for reception and execution of programmed commands between a GPIB bus controller and the 1250 switch controller (shown in Figure 2-5) located on the rear panel of the 1250. The pin location, line identification, and operation of the GPIB-Bus are in compliance with IEEE-Standard-488-1978.




| Pin No. | Assignment | Pin No. | Assignment |
|---|---|---|---|
| 1 | DIO 1 | 13 | DIO 5 |
| 2 | DIO 2 | 14 | DIO 6 |
| 3 | DIO 3 | 15 | DIO 7 |
| 4 | DIO 4 | 16 | DIO 8 |
| 5 | EOI | 17 | REN |
| 6 | DAV | 18 | GND, (6) |
| 7 | NRFD | 19 | GND, (7) |
| 8 | NDAC | 20 | GDN, (8) |
| 9 | IFC | 21 | GND, (9) |
| 10 | SRQ | 22 | GND, (10) |
| 11 | ATN | 23 | GND, (11) |
| 12 | SHIELD | 24 | GND, (5 AND 17) |



**Figure 2-5 - GPIB-Connector (Rear Panel)**

## 2.6.6 GPIB Interface Signal Pin Assignments

2.6.6.1 GPIB interface signal pin assignments are shown in Figure 2-6. Also, refer as required to the GPIB interface subsets available using the 1250 shown in Table 1.1.

2.6.6.2 There are 24 lines available at the GPIB connector, including 16 signal and 7 ground return lines, and one shield. All of the data bus lines are bidirectional, having the following characteristics:

Logic Levels: 1 = Low = .8V
0 = High = 2.0V

Input Loading: Each input = one TTL load

Output: The output is capable of driving 15 interface bus loads. It consists of an open-collector driver and is capable of sinking 48 mA with a maximum voltage drop of 0.4 volts.

| Pin | Nomenclature | Description | |
|---|---|---|---|
| 1 | DIO-1 | Data In/Out Bit 1 (LSB) | |
| 2 | DIO-2 | Data In/Out Bit 2 | |
| 3 | DIO-3 | Data In/Out Bit 3 | Data lines are used to transfer |
| 4 | DIO-4 | Data In/Out Bit 4 | data from one instrument to |
| 13 | DIO-5 | Data In/Out Bit 5 | another |
| 14 | DIO-6 | Data In/Out Bit 6 | |
| 15 | DIO-7 | Data In/Out Bit 7 | |
| 16 | DIO-8 | Data In/Out Bit 8 | |
| 6 | DAV | (Data Valid) | |
| 7 | NRFD | (Not Ready for Data) | |
| 8 | NDAC | (Not Data Accepted) | |
| 5 | EOI | (End or Identify) | |
| 9 | IFC | (Interface Clear) | |
| 10 | SRQ | (Service Request) | |
| 11 | ATN | (Attention) | |
| 17 | REN | (Remote Enable) | |
| 12 | SHIELD | | |
| 18 | GND (6) | | |
| 19 | GND (7) | | |
| 20 | GND (8) | | |
| 21 | GND (9) | | |
| 22 | GND (10) | | |
| 23 | GND (11) | | |
| 24 | GND (5 and 17) | | |

**Figure 2-6 - Interface Signal Pin Assignments**

## 2.7 Equipment Rack Installation

### 2.7.1 Introduction

2.7.1.1 The 1250 may be mounted in a standard 19-inch equipment rack. The 1250 may be rack-mounted front-forward or rear-forward. Using Slide Mount Option 65, the 1250 must be slide-mounted front-forward. Installation instructions for this option follow.

### 2.7.2 Slide-Mount Option 65 Installation

2.7.2.1 Refer to Figures 2-7 and 2-8 for this procedure. The installation package includes:

a. Front rack-brackets (2); part of P/N 454488

b. Rear rack-brackets (2); part of P/N 454488

c. Triple-rail slide-mount assemblies (2); P/N 454489

d. Self-anchoring #10-32 tinnerman nuts (12); P/N 610920

e. Phillips panhead #10-32 x 1/2 screws (8); P/N 615091

f. Slotted panhead #8-32 x 3/8 screws, nuts, flat washers, and lock washers (8 each); part of P/N 454488

g. Phillips panhead self-tapping #8-32 x 5/16 screws (4); P/N 610910

h. Phillips panhead #10-32 x 3/4 screws (4); P/N 615093

2.7.2.2 Refer to Figure 2-7A/B. Prepare the triple-rail slide-mount assembly for equipment rack installation. First, note that the instrument-rail and rack-rail holes are accessible either directly or through the enlarged holes in the center-rail (as the assembly is extended or retracted). Complete the following procedure:

a. Place a front rack-bracket (with one mounting slot) on the workbench, slotted flange facing down

b. Position the front end (i.e., slide-out end) of the slide-mount assembly over and parallel to the front rack-bracket. The rack-rail should rest within the bracket, about 3 1/4 inches from the bracket's front edge

c. Adjust the rails, aligning the front rack-rail hole with the center-rail access hole and mounting slot in the front rack-bracket. Insert a

slotted panhead #8-32 x 3/8 screw through the holes. Attach a washer, lock washer, and nut to the screw and secure firmly, maintaining the 3 1/4-inch dimension to the front of the bracket

NOTE

Measure the distance between the front and rear mounting-rails of the rack at this point. If the distance is less than 20 inches, follow instruction "d" next; if the distance is greater than 20 inches, follow instruction "e".

d. Fully extend the slide-mount assembly. Position a rear rack-bracket (with two elongated mounting slots) on the rear of the assembly in the same way as the front rack-bracket. Align the mounting slot closest to the slotted flange with the rear rack-rail nail hole. Insert a slotted panhead #8-32 x 3/8 screw through the holes. Attach a washer, lock washer, and nut to the screw and secure the rear rack-bracket loosely to the slide-mount assembly

e. Fully extend the slide-mount assembly. Position a rear rack-bracket (with two elongated mounting slots) on the rear of the assembly in the same way as the front rack-bracket. Align the mounting slot farthest from the slotted flange with the rear rack-rail nail hole. Insert a slotted panhead #8-32 x 3/8 screw through the holes. Attach a washer, lock washer, and nut to the screw and secure the rear rack-bracket loosely to the slide-mount assembly

f. Complete the other slide-mount and rack-bracket assembly in the same manner as just described

g. Slide two self-anchoring #10-32 tinnerman nuts on the front and rear rack-brackets at the top and bottom slots of both slide-mount assemblies

2.7.2.3 The assistance of a second person will be needed for the following instrument-rack assembly. Secure the slide-mount assembly in the designated area of the instrument rack using the procedure below.

NOTE

If the mounting rail of the instrument rack is tapped for #10-32 screws, drill out two places for each bracket using a 1/4 inch diameter bit. Proceed with the assembly.

a. Hold the front end of the slide-mount assembly behind the front mounting-rail of the rack, while the second person holds the rear end of the assembly

b. Secure the front rack-bracket to the front mounting-rail using two phillips panhead #10-32 x 1/2 screws. Seat the front rack-bracket firmly against the mounting-rail before tightening these screws

c. Install the other front rack-bracket on its front mounting-rail in the same manner

d. Set the front dimension between the two slide-mount assemblies at 16 5/8 inches

e. Adjust the length of the rear rack-brackets so that they touch the inside of the rear mounting-rail. Tighten the rear rack-bracket assembly screws

f. The distance between the two slide-mount assemblies at the rear-bracket should be 16 5/8 inches. Should a filler plate be required to secure the slide-mount assembly to the rear rack mounting-rail at 16 5/8 inches, use the dimensions given in Figure 2-8 to determine filler-plate size

NOTE

The rear rack-bracket may require adjustment to accommodate the thickness of the filler plate.

g. Secure the rear rack-bracket to the rear rack mounting-rail (or filler plate) using two phillips panhead #10-32 x 1/2 screws in each bracket

h. The triple-rail slide-mount assemblies should move freely to their maximum extended positions. If not, remove any obstacle before installing the instrument

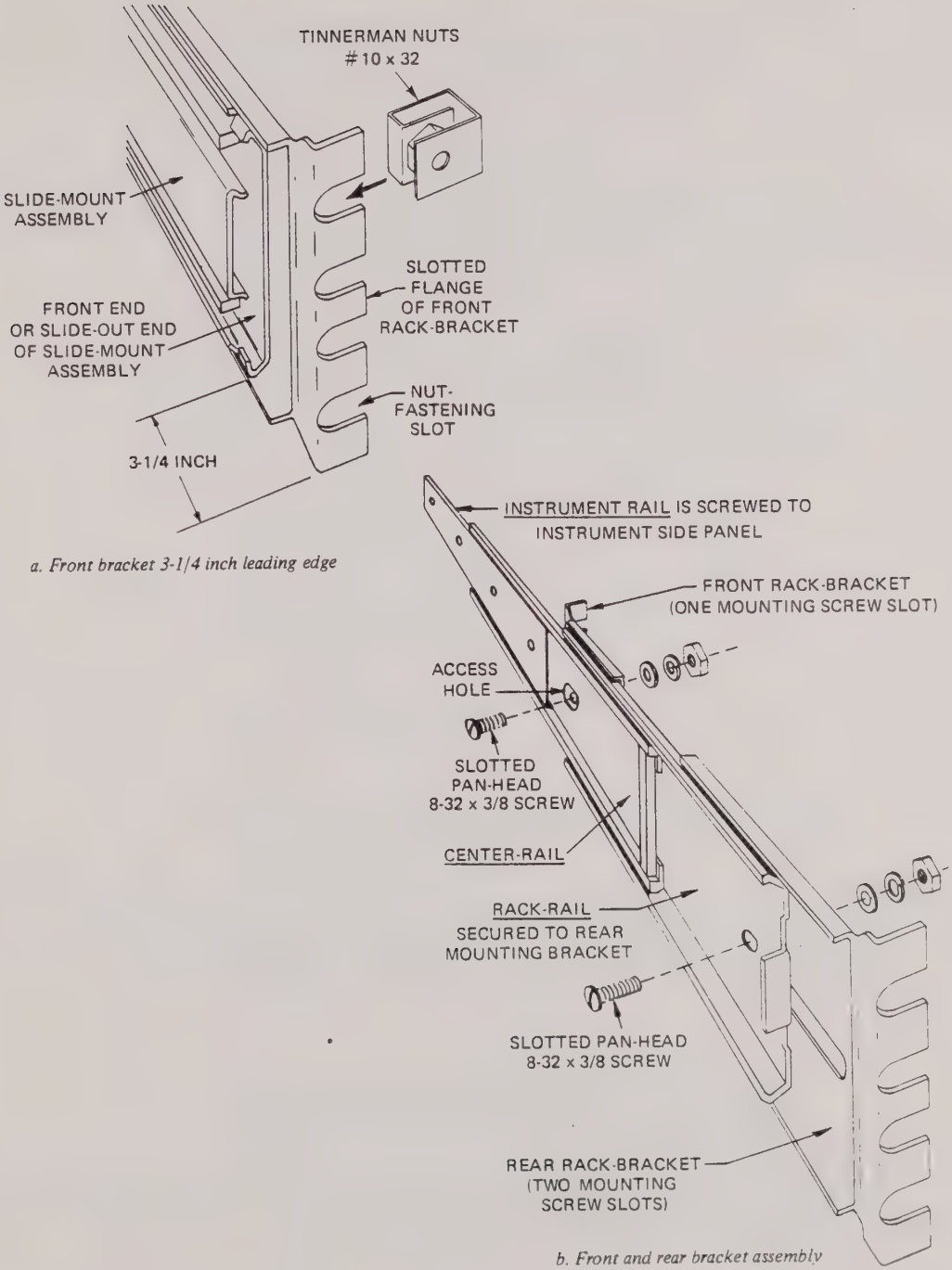

TINNERMAN NUTS
#10 x 32
SLIDE-MOUNT ASSEMBLY
SLOTTED FLANGE OF FRONT RACK-BRACKET
FRONT END OR SLIDE-OUT END OF SLIDE-MOUNT ASSEMBLY
NUT-FASTENING SLOT
3-1/4 INCH
a. Front bracket 3-1/4 inch leading edge
INSTRUMENT RAIL IS SCREWED TO INSTRUMENT SIDE PANEL
FRONT RACK-BRACKET (ONE MOUNTING SCREW SLOT)
ACCESS HOLE
SLOTTED PAN-HEAD 8-32 x 3/8 SCREW
CENTER-RAIL
RACK-RAIL SECURED TO REAR MOUNTING BRACKET
SLOTTED PAN-HEAD 8-32 x 3/8 SCREW
REAR RACK-BRACKET (TWO MOUNTING SCREW SLOTS)
b. Front and rear bracket assembly

**Figure 2-7A,B - Slide-Mount and Bracket Assembly**

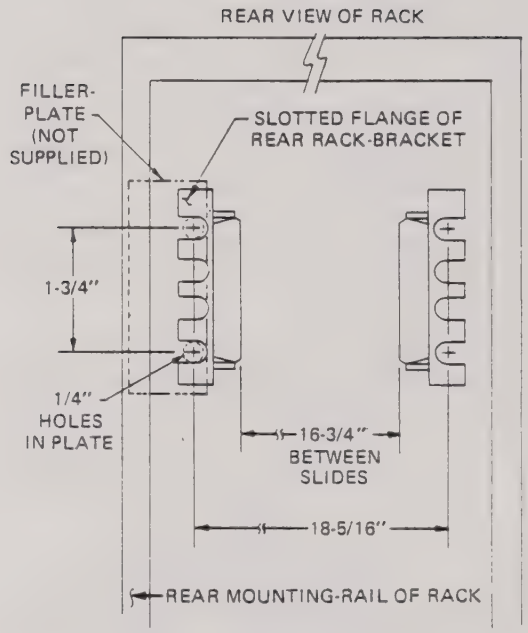



**Figure 2-8 - Rear End Slide-Mount Rack Dimensions**

2.7.2.3 Refer to Figures 2-9A, B, and C and 2-10 for the following procedure. Figure 2-9A shows the 1250 with the standard configuration with the flange-mount angle-bracket located at the front of the instrument. Figure 2-9B shows the 1250 with one of the two rear-forward rack-mount configurations.

**NOTE**

Rear-forward rack-mount configurations may not use the Option 65 slide mounts.

This installation has the angle-brackets mounted on the rear of the instrument with the 1250's rear panel recessed. This installation is accomplished by completing the following procedure:

a. Extend the rails of the slide-mount assemblies to their maximum positions for installation

b. Remove the flange-mount angle-brackets from the front of the

instrument. Rescrew the front handles in their normal front locations using two #8-32 x 1/2 angle-bracket screws

c. Remove the four rubber plugs at the rear of the instrument using a sturdy, pointed instrument

d. Using the two remaining phillips panhead self-tapping #8-32 x 1/2 screws (from the previously front-mounted angle-brackets), reattach the two angle-brackets securely at the rear of the instrument as shown in Figure 2-9B.

Figure 2-9C shows the second rear-forward rack-mount configuration for the 1250. This installation has the angle-brackets mounted on the rear of the instrument with the 1250's rear panel nearly flush with these brackets. This installation is achieved by completing the following procedure:

a. Extend the rails of the slide-mount assemblies to their maximum positions for installation

b. Remove the flange-mount angle-brackets from the front of the instrument. Rescrew the front handles in their normal front locations using two #8-32 x 1/2 angle-bracket screws

c. Remove the four rubber plugs at the rear of the instrument using a sturdy, pointed instrument

d. Reverse the positions of the instrument's side panels as shown in the figure. (The angle-bracket holes formerly at the front will now be at the rear of the instrument.)

e. Using the two remaining phillips panhead self-tapping #8-32 x 1/2 screws (from the previously front-mounted angle-brackets), reattach the two angle-brackets securely at the rear of the instrument as shown in Figure 2-9C

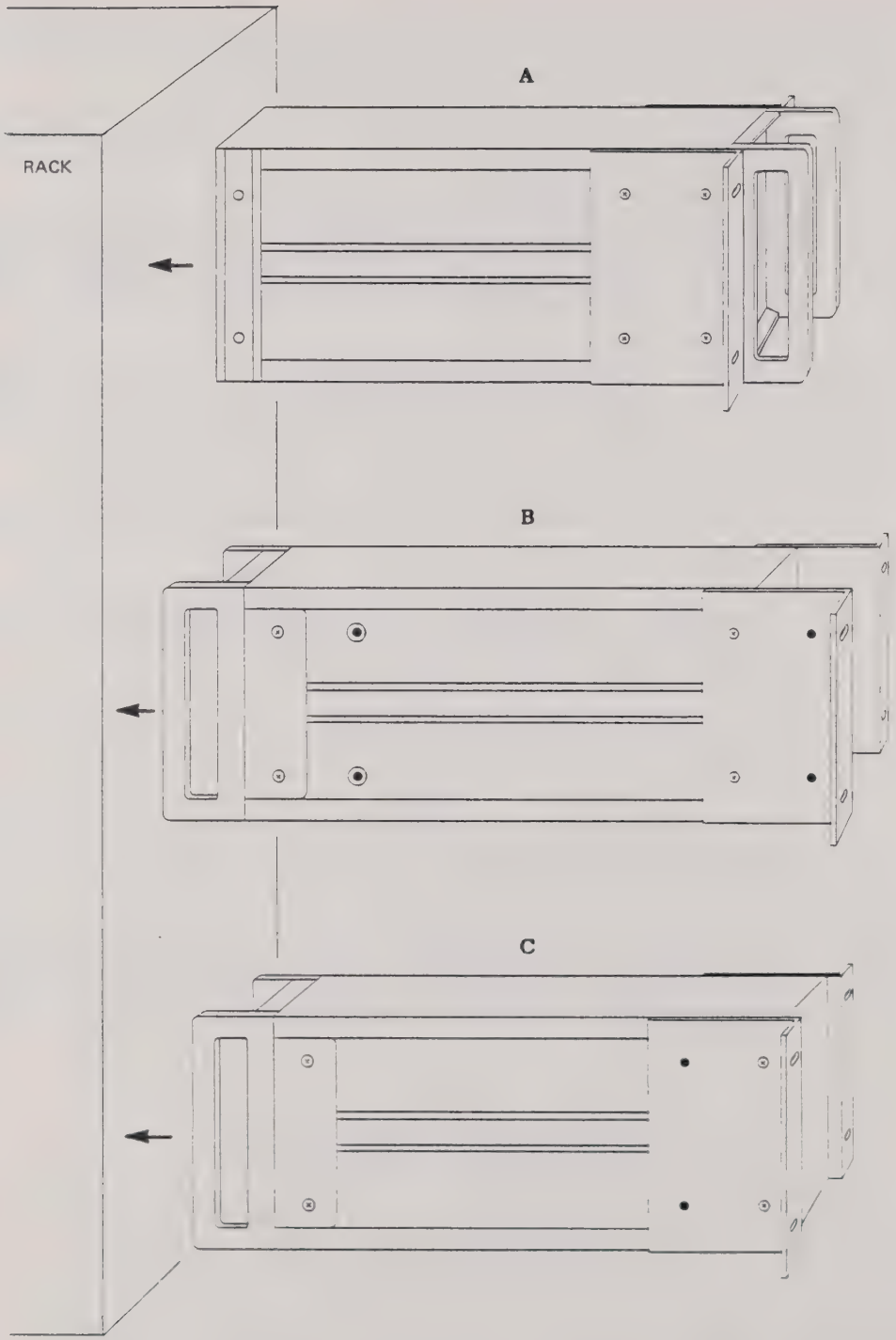



**Figure 2-9 - Standard (A) and Optional Rear-Forward Rack-Mount (B and C) Assembly-to-Instrument Configurations**

2.7.2.4 Refer to Figure 2-10. Mount the instrument-rail of the slide assembly securely to the side channel using the top slot and two phillips panhead self-tapping #8-32 x 5/16 screws. Ensure that the instrument-rail is flush against the rear of the flange-mount angle-bracket. Complete the same procedure for the other side of the instrument.

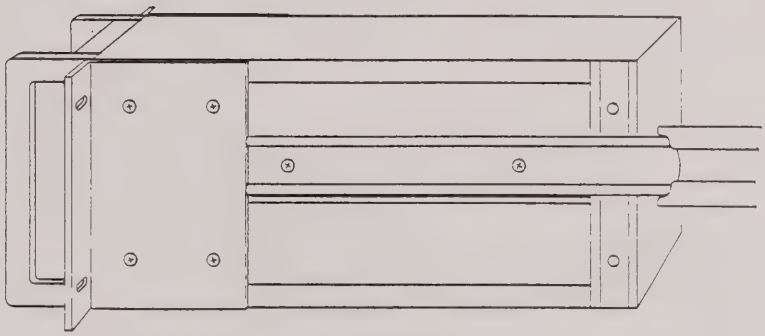


**Figure 2-10 - Slide Assembly-to-Side Channel Installation**

2.7.2.5 The instrument should now slide freely on the rails.

2.7.2.6 The following assembly is required to lock the instrument into its operating position on the racks:

a. Slide two self-anchoring #10-32 tinnerman nuts on the mounting-rail of the rack (each side). These nuts should be aligned with the angle-bracket slots. Omit the tinnerman nuts if the mounting-rail is tapped for #10-32 screws

b. Slide the instrument fully into the rack until the angle brackets strike the slide-mount bracket screws. Secure the instrument in place using four phillips panhead #10-32 x 3/4 screws

## 2.8 Intelligent Front Panel (Option 90) Installation

**2.8.1 Standard Mounting** - refer to Figures 2-11 and 2-12 and complete steps a-e to install the Option 90 on the front of the 1250.

**2.8.2 Remote Mounting** - refer to Figures 2-13 and 2-14 and complete step f for "remote" mounting or use of Option 90 with the 1250.

**2.8.3 Rear-Forward Rack Mounting** - refer to subsection 2.7, including Figure 2-9, of the 1250 Manual for rear-forward rack-mounting instructions.

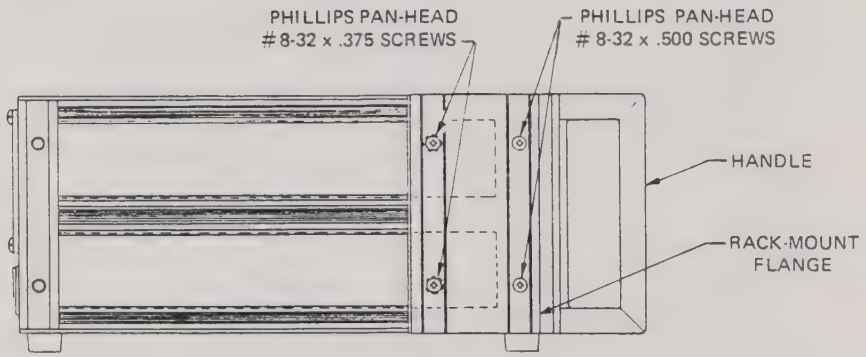



**Figure 2-11 - 1250 Side View (Left)**

### 2.8.4 Standard Mounting

a. Refer to Figure 2-11. Remove the two phillips panhead #8-32 x 3/8 screws and two phillips panhead #8-32 x 1/2 screws from each side of the 1250

b. Remove the two rack-mount flanges and the two handles from the unit; store parts for possible separate mounting of the 1250 chassis and Intelligent Front Panel in the future

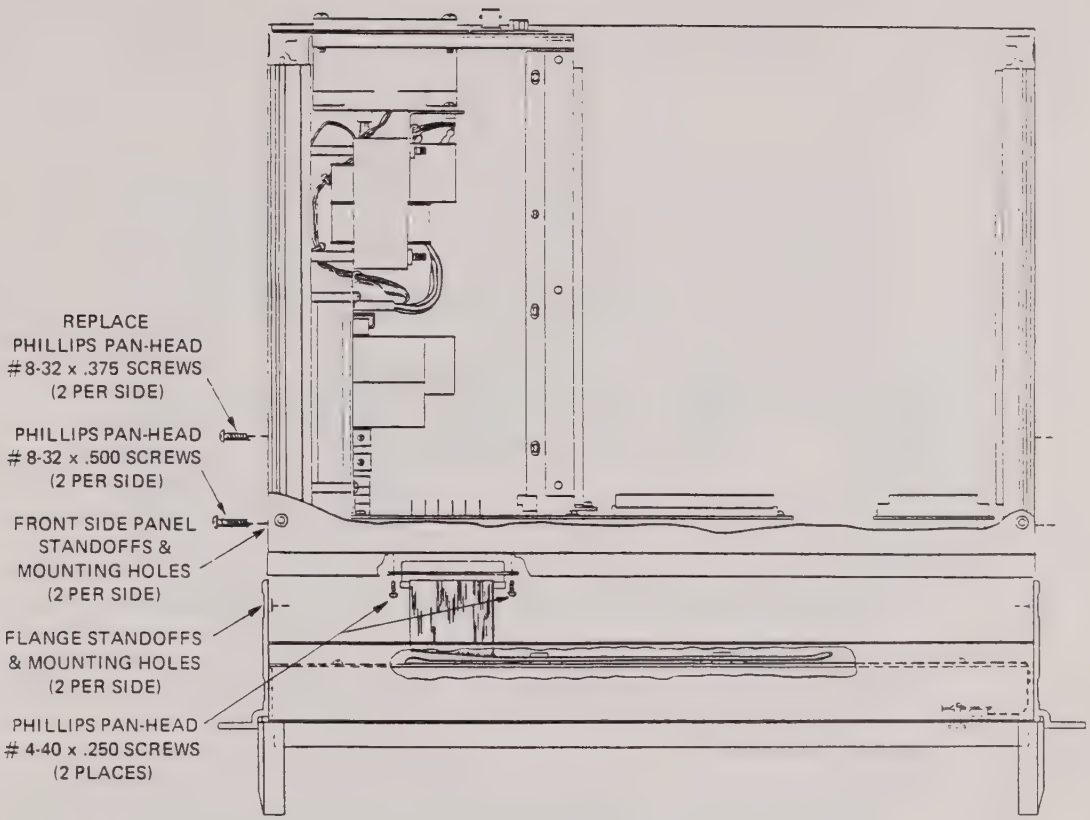



**Figure 2-12 - Option 90 to 1250 Chassis Installation**

c. Refer to Figure 2-12. Secure the Option 90 cable connector into its receptacle on the front panel of the 1250 chassis with the two supplied #4-40 x 1/4 screws and place the power switch on the 1250 chassis in the OFF position

d. Place the Option 90 onto the front of the 1250 chassis. Align the two standoffs/mounting holes on the inside of each Option 90 rack-mount flange with the existing two standoffs/mounting holes in the front of each 1250 side panel

e. Use the four phillips panhead #8-32 x 1/2 screws removed in step a to securely fasten the Option 90 to the 1250 chassis. Replace all four phillips panhead #8-32 x 3/8 screws removed in step a

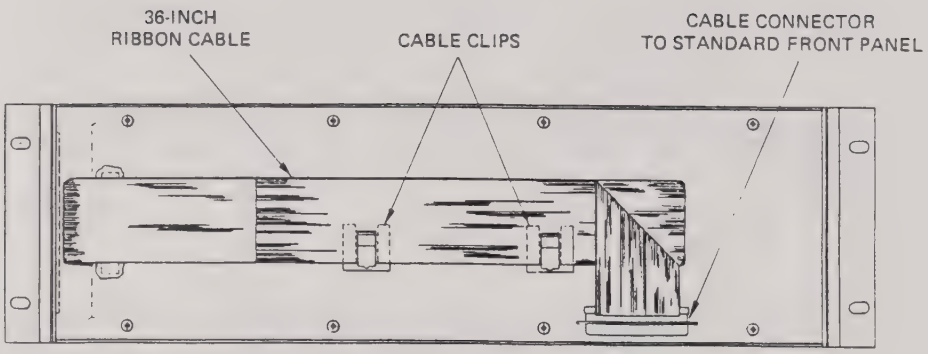



**Figure 213 - Rear View of Option 90 Showing Ribbon Cable**

### 2.8.5 Remote Mounting

f. Refer to Figures 2-13 and 2-14. If you wish to mount or use the Option 90 Intelligent Front Panel "remote" from the 1250, first unhook the 36-inch ribbon cable from its two flat cable clips on the rear of the front panel option. Then, simply plug the option's cable connector into the 37-pin D-subminiature receptacle on the standard front panel and secure the connector with the two supplied #4-40 x 1/4 screws

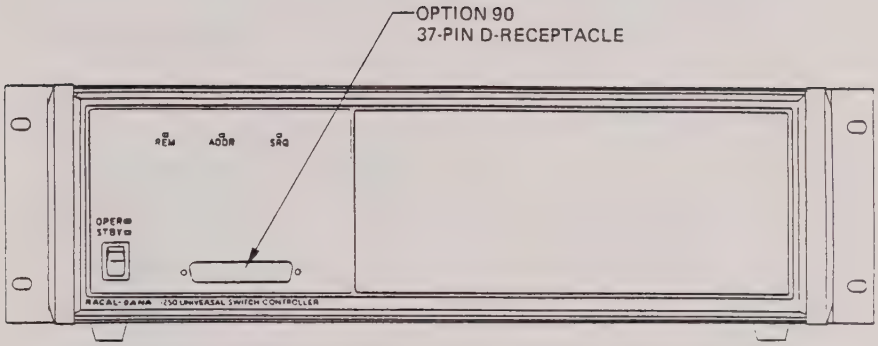



**Figure 2-15 - Front View of Standard Front Panel Showing Option 90 D Receptacle**

## 2.9 Storage and Temperature

2.9.1 The 1250 can be stored at temperatures ranging from -40° C to +70° C at 95% relative humidity without adverse effects to PCBs or components. The 1250 must be brought within its specified operating range of 0° C to +55° C before commencing operation.

## 2.10 Ventilation Requirements

2.10.1 To maintain internal temperatures within safe limits it is important not to obstruct the airflow to the instrument.

# SECTION 3 OPERATION

## 3.1 Introduction

3.1.1 This section supplies the information required to operate the 1250 Universal Switch Controller, both remotely and locally. The information required for each of the 1250 Series modules is different, so a section detailing the command formats required for each module is also supplied.

## 3.2 1250 Home State

3.2.1 The default condition (Home State) of the 1250 is as follows:

CNF (Confidence test) OFF
DLY (Delay) 0
DSP (Display) ON
EQU (Equate list) 0
EXCL (Exclude list) 0
SCAN ON
SLIST (Scan list) 0
SRQMASK 44
TRIG (Trigger) ON
PUPRCL (Power up recall) - Same as on power down

All non-latching relays fitted to the 1250 Series switch modules are in their de-energised states.

3.2.2 The 1250 will not power up in this state if the power up recall mode is active. This mode sets the 1250 to the configuration stored in non volatile memory location 1 at power up.

3.2.3 The 1250 will return to the home state in response to the RESET command and the GPIB SDC and DCL commands.

## 3.3 1250 Front and Rear Panels

3.3.1 Refer to Figure 3-1 for a view of the 1250 Front Panel and to Table 3-1 for descriptions of the 1250 Front Panel features.

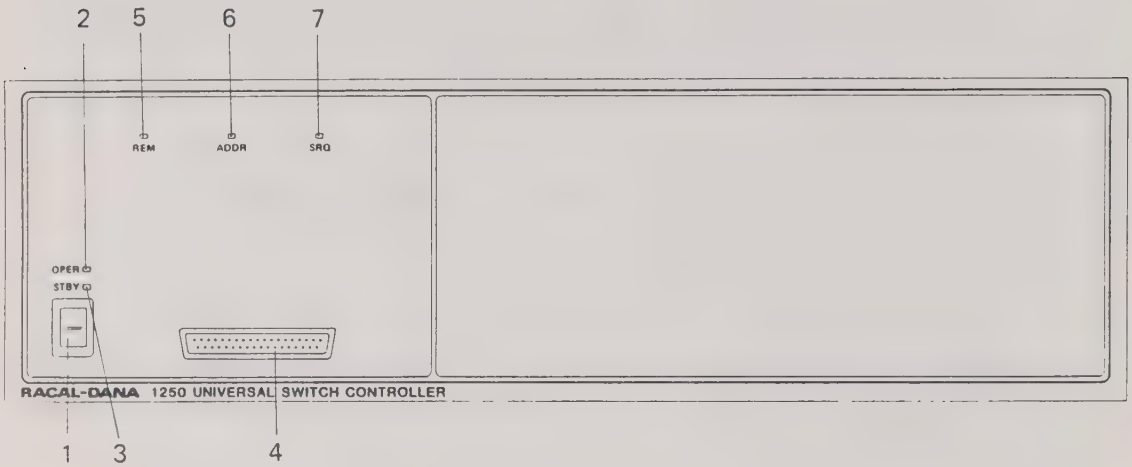



**Figure 3-1, 1250 Front Panel**

| Reference | Description |
|---|---|
| 1 | Power Switch. This rocker switch places the 1250 in either the operating mode or the standby mode. |
| 2 | OPER LED. This LED lights to show that the 1250 is in the operating mode. |
| 3 | STBY LED. This LED lights to show that the 1250 is in the standby mode. |
| 4 | Option 90 (Intelligent Front Panel) connector. This 37 pin D-Subminiature connector is provided to allow installation of Option 90 on the 1250. |
| 5 | REM LED. This LED lights to show that the 1250 is in the GPIB remote mode. |
| 6 | ADDR LED. This LED lights to show that the 1250 is addressed over the GPIB. |
| 7 | SRQ LED. This LED lights to show that the 1250 has asserted the GPIB SRQ line. |

3.3.2 Refer to Figure 3-2 for a view of the 1250 Rear Panel and to Table 3-2 for descriptions of the 1250 Rear Panel features.

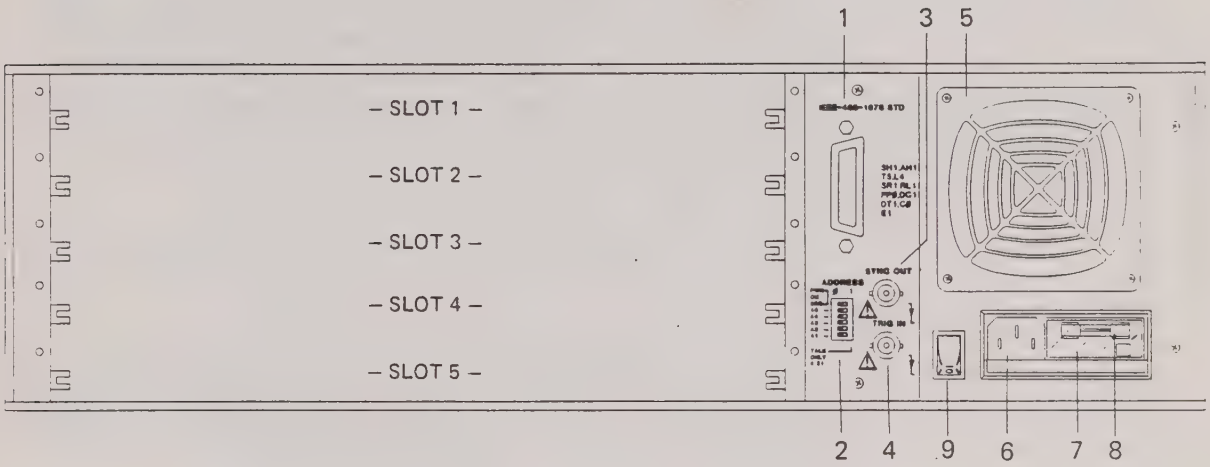



**Figure 3-1, 1250 Rear Panel**

| Reference | Description |
|---|---|
| 1 | GPIB (IEEE-STD-488) Connector. |
| 2 | GPIB address switch. The lower five switches fitted in this switch bank are used to set the GPIB address of the 1250. The sixth switch determines whether the 1250 Power Up SRQ feature is active. This feature, when active, causes the 1250 to unconditionally assert SRQ on power up. |
| 3 | SYNC OUT connector. This BNC connector outputs a TTL compatible, active high signal while a command string is being processed. A delay between relay switching and the Sync pulse returning to a low level may be achieved by the use of the DLY command. |
| 4 | TRIG IN connector. This BNC connector input accepts TTL level signals to cause the 1250 to proceed to the next element of the scan list. The trigger input must be enabled by the TRIG ON command or from the Intelligent Front Panel (Option 90) and the scan mode activated for this to occur. |

5 Fan. This supplies the forced air cooling required by the 1250.

6 Line input. This is a standard AC supply connector.

7 Line voltage selector. This removable printed circuit card selects the line voltage that the 1250 will operate on. The voltage selected is printed on the card and is visible through the fuse cover fitted. To change the voltage selected, remove the card and reinsert with the desired voltage visible. The line voltages that the 1250 will operate on are 100, 120, 220 and 240 V.

8 Line fuse. This is a glass cartridge slow blow fuse, value 1.5 A for 100 and 120 volt operation and 0.75 A for 220 and 240 volt operation.

9 AC power switch. This rocker switch connects the AC line to the 1250 power supply. It glows red in position 1 to show that the 1250 has power applied. Note that the front panel power switch must also be in the OPER position for the 1250 to be operated.

## 3.4 GPIB Input Format

3.4.1 The 1250 will recognize commands as soon as two or more characters are received, (a "wild card parser"). For example, a CLOSE command would be recognized by the 1250 if the characters CL, CLO, CLOS, or CLOSE were detected. Similarly, OP, OPE, or OPEN are valid for an OPEN command.

3.4.2 The following two restrictions apply:

a. The spelling of the command must be correct. For example, "OPD", "OPR", "OP (any letter besides E)" would be considered errors for the OPEN command.

b. All commands in the command set can be recognized from two letters with the exception of the RESET, READ, and RECALL commands, which require a **minimum** of three letters.

3.4.3 The general syntax for all 1250 command lines is the following:

<command> [arg 1] [arg 2] ... [arg n] <terminator>. Hyphenated expression-arguments must be in ascending order.

3.4.4 Only one individual 1250 command and its arguments may appear on each command line.

3.4.5 Commands may be upper or lower-case or a combination of the two.

3.4.6 In general, there is no limit on the length of a 1250 command string. Several commands do, however, place a limit on the number of arguments which may appear in the command string. The EXCLUDE function allows a maximum of 50 arguments in the list, the EQUATE function and the SCAN LIST allow 85 arguments.

3.4.7 Each 1250 command line must be properly terminated. The 1250 recognizes two different terminators: line feed (ASCII $0A) and EOI. Any combination of these two terminators is acceptable. Note that a carriage return - line feed pair is also acceptable because of the line feed present.

## 3.5 GPIB Output Format

3.5.1 Each line of text output from the 1250 will have a leading space (ASCII value $20).

3.5.2 All output strings are in upper case.

## 3.6 Serial Poll Status Byte

3.6.1 Table 3.3 shows the status byte format for the 1250. This byte is returned to the controller in response to a serial poll enable (SPE) message.

**Table 3.3 - Status Byte Format**

| Bit Number | Description |
|---|---|
| 1 (LSB) | Unused |
| 2 | Unused |
| 3 | Power-On SRQ |
| 4 | Scan List at Break Point |
| 5 | Ready |
| 6 | Programming Error |
| 7 | Service Requested |
| 8 (MSB) | Unused |

**NOTE**

When bit 7 of the status byte (Service Requested) is set to show that SRQ is asserted, the 1250 will not respond to any GPIB commands until the interrupt is serviced. This may be done remotely with a serial poll, or locally with the RESET key. After the interrupt has been serviced, the error code generated may be obtained over the GPIB in response to the YERR

command.

3.6.2 Bits 3, 4, 6, and 7 are cleared after each Serial Poll Enable (SPE) command. Bit 5 is cleared by sending instructions to the 1250 and is set when the 1250 finishes executing a command. These transitions are coincident with the rising and falling edges of the SYNC OUT output, respectively. All status bits are active-high.

## 3.7 Power-up Self Tests

3.7.1 At power-up, the 1250 completes a series of self-tests and configures itself for the current complement of modules. If any phase of the self-test fails, or if an error is detected during the configuration process, the 1250 flags an error and alerts the user. With the Option 90 Intelligent Front Panel installed, a successful power-up will display the following message:

RACAL DANA 1250

3.7.2 The 1250 Power-up tests occur in the following order:

a. ROM/RAM/NON-VOL Test

b. CPU Circuitry/Backplane Bus Test

c. Self-Configuration

Errors that occur during the 1250 power up sequence are reported by the 1250 front panel LEDs as follows:

| REM LED | ADDR LED | FAILURE |
|---|---|---|
| OFF | ON | ROM/RAM/NON-VOL Test |
| ON | OFF | CPU Circuitry/Backplane Bus Test |
| ON | ON | Self-Configuration Test |

All three of the above self test failures are fatal. The 1250 will enter a "lockout" state after a self-test or configuration error occurs. In this state, the 1250 will not respond to any GPIB commands and if Option 90 is fitted, the front panel controls will be inoperative.

## 3.8 Device Dependant Command Codes

3.8.1 This section of the manual gives the GPIB command codes used to control the 1250 Series switch modules. It describes the general syntax required for each command code and then describes the action taken to implement the command. Note that not all commands are supported by the 1250 Series switch modules. This is because:

1) The command may be inappropriate for the switching module in question, e.g. the WRITE command does not apply to a relay switching module.

2) The command may be directed to the 1250 chassis controller rather than the plug-in modules themselves, e.g. the CNF command will turn the 1250 confidence check on or off or the SLIST command will enter the scan list into the 1250. Both of these affect the 1250 Series plug-in modules indirectly, but do not affect the state of the switch modules immediately.

Refer to Section 3.4 for the module specific syntax used by each 1250 Series switching module. This section will also supply information on the commands that do not follow exactly the command code syntax specified here.

### 3.8.2 CLOSE <module specific syntax> [;<module specific syntax>].....

3.8.2.1 This command causes one or more connections on a switching module to close. It is the converse of the OPEN command. Any number of connections in more than one slot may be closed in one CLOSE statement if the <slotnumber>.<module specific syntax> sections are concatenated using a semi-colon (;). Refer to Section 3.5 for the <module specific syntax> to be used for each 1250 Series switching module.

### 3.8.3 CNF <ON|OFF>

3.8.3.1 This command turns the 1250 Confidence test on or off. The Confidence test checks that the state of all relays is as programmed. It causes the 1250 to assert the SRQ line after each OPEN or CLOSE command is processed and lights the ERR LED if Option 90 (Intelligent Front Panel) is fitted. A character string detailing the 'error' (error 99, Passed Confidence Test or error 51, Failed Confidence Test,) may be obtained from the 1250 in response to a Serial poll followed by the YERR command. The character string that the YERR command causes the 1250 to generate is "error <slotnumber>.51" or "error <slotnumber>.99". The default (power-up) state for the confidence test is OFF.

### 3.8.4 DLY <value>

3.8.4.1 This command is used to cause a delay between the last relay closure after a command string is processed and the SYNC OUT pulse. <value> may be 0-655 ms, and is set to zero at power up.

### 3.8.5 EQU <equate list>

3.8.5.1 This command causes any OPEN, CLOSE or TRIG/SCAN commands addressed to any switching module on the <equate list> to be carried out for all switch modules on the <equate list>. All modules on the list are required to be identical.

3.8.5.2 The <equate list> is made up of the slot numbers of the switch modules that are to be equated separated by a semi-colon (;). Continuous groups of switch modules may be entered onto the <equate list> by entering the first and last modules to appear on the list joined by a hyphen (-). More than one equate group may be set up in a single EQU statement by separating the equate groups with a comma (,).

**Example:** EQU 1;3-6

This command will equate slots 1, 3, 4 and 5 as one equate group.

NOTE

All switch modules must be of the same type to be accepted in the same equate list or the 1250 will generate an error.

NOTE

Use of the EQU command will overwrite all previously entered <equate list>s. An <equate list> of 0 may be used to clear all equate groups.

NOTE

When an <equate list> is entered, all switch modules on the list adopt the state of the first module to appear on the list.

### 3.8.6 EXCL <exclude list>

3.8.6.1 This command causes the 1250 to regard the channel closures specified in the <exclude list> as mutually exclusive. A channel is described in the <exclude list> by the slotnumber of a switching module and module specific syntax to describe the relay closures in a channel. Refer to Section 3.9 for the module specific syntax of the various switch modules available. Continuous groups of switch modules may be entered onto the <exclude list> by entering the first and last modules to appear on the list joined by a hyphen (-). More than one <exclude list> may be specified in an EXCL statement by separating the Exclude groups with the letter E and a semi-colon (E;). In this case, only one of the channels in each exclude group may be closed.

**NOTE**

Use of the EXCL command will overwrite all previously entered <exclude list>s. An <exclude list> of 0 may be used to clear all exclude groups.

### 3.8.7 OPEN <module specific syntax> [;<module specific syntax>].....

3.8.7.1 This command causes one or more connections on a switching module to open. It is the converse of the CLOSE command. Any number of connections in more than one slot may be opened in one OPEN statement if the <slotnumber>.<module specific syntax> sections are concatenated using a semi-colon (;). Refer to Section 3.9 for the <module specific syntax> to be used for each 1250 Series switching module.

### 3.8.8 PDATAOUT <slotnumber>;<slotnumber>.....

3.8.8.1 This command causes the specified switch modules to output the present state of the relays contained in those modules. Data for slot 0 (the controller), after the identification string consists of the revision level of the 1250 operating system.

3.8.8.2 More than one slot number may be specified for this command by hyphenating the first and last slots to be examined. In this case, all 1250 slots with a 1250 Series module fitted in the range specified will respond to the PDATAOUT command in ascending slotnumber order.

3.8.8.3 An example character string output by a 1250 with switch modules installed in slots 1 and 5 in response to a PDATAOUT 0-5 command is given below.

0.MODEL 1250 UNIVERSAL SWITCH CONTROLLER
0.OS Rev 1.2 1250
1.1250-50 200 MHZ RF SWITCHING MODULE
1.20-22
5.1250-30 SCANNER/MULTIPLEXER MODULE
5.1-4,8,13
5.END

**NOTE**

The switching module configuration is described in the same format as is required by the OPEN and CLOSE commands.

**NOTE**

The character string output by the 1250 is made up of multiple lines and contains carriage-return, line-feed pairs. These may terminate the output string and so the PDATAOUT RESPONSE must be read repeatedly until all lines of the output have been read for all modules specified. The final line output by the 1250 is <slotnumber>.END where <slotnumber> is the address of the slot that the last 1250 Series module described is resident.

### 3.8.9 PSETUP <slotnumber> [;<slotnumber>]....

3.8.9.1 This command causes the 1250 to output a character string describing the setup of the switching system master and switch modules. An example of a character string obtained in response to a PSETUP command from a 1250 with switch modules installed in slots 1 and 5 is given below.

0.MODEL 1250 UNIVERSAL SWITCH CONTROLLER
0.CNF OFF
0.DLY 0
0.DSP ON
0.EQU 0
0.EXCL 0
0.SCAN ON
0.SLIST 0
0.SRQMASK 44
0.PUPRCL OFF
0.END
1.1250-50 200 MHZ RF SWITCHING MODULE

1.BBM
5.1250-30 SCANNER/MULTIPLEXER MODULE
5.IMM
5.END

NOTE

The character string output by the 1250 is made up of multiple lines and contains carriage-return, line-feed pairs. These will terminate the output string and so the PSETUP output string must be read repeatedly until all lines of the output have been read for all modules specified. The final line output by the 1250 is <slotnumber>.END where <slotnumber> is the address of the chassis slot that the last 1250 Series module present in the chassis.

### 3.8.10 PUPRCL <ON|OFF>

3.8.10.1 This command enables and disables the automatic recall of the switch settings stored in non-volatile memory location 1 at power up. The configuration in non-vol location 1 is stored by the use of the STORE command. Refer to Section 3.8.18 for details of the STORE command.

NOTE

If non-volatile location 1 is cleared and PUPRCL is ON, no recall will take place at power up.

NOTE

The Power up recall feature status is not changed by the RESET command. This feature will retain the status that it had on power down.

### 3.8.11 READ <slotnumber>.<portnumber>

where <slotnumber> ::= 1|2|3|4|5
<portnumber> ::= 0|1|2

3.8.11.1 This command is supported by 1250 Series digital and breadboard cards only. It allows the data appearing at one of the 1250 Series digital or breadboard cards eight bit ports to be read by the system controller via the GPIB or the optiona intelligent front panel.

### 3.8.12 RECALL <non-vol location>

where <non-vol location> = 1|2|.....|51

3.8.12.1 This command will set all switch modules in the 1250 chassis to the configuration stored in the non-volatile location specified. Note that an error will be generated if an attempt is made to RECALL a memory setting into a switching system configuration that differs from the configuration present when the memory setting was stored. An error will also be generated if an attempt is made to RECALL a memory setting from an empty location.

**NOTE**

1250 Universal Switch Controllers containing operating systems at level 13.1 or lower have 63 non-volatile memory locations available. The operating system level installed may be obtained with the command "PDATAOUT O".

### 3.8.13 RESET

3.8.13.1 This command causes the 1250 to return to its home state and all 1250 Series switch modules to be set to their de-energised states. Note that the RESET command will not change the Power up recall (PUPRCL) feature.

### 3.8.14 SCAN <ON|OFF|CONT>

3.8.14.1 The SCAN ON command causes the 1250 to open and close the channels as specified in the scan list in turn. Each channel is closed on receipt of a trigger input or command. The 1250 will scan the channels until it reaches a break point or the SCAN OFF command is received. Refer to Section 3.4.16 for further details of the scan list. Note that connecting the 1250 SYNC OUT output to the TRIG IN input will result in the 1250 scanning the channels specified with a delay between each closure equal in duration to that specified by the DLY command until a break point or SCAN OFF command is encountered.

3.8.14.2 SCAN OFF causes the 1250 to stop scanning. Scanning may only be resumed by the use of the SCAN ON or SCAN CONT commands.

**NOTE**

The SCAN command may also be used to recall non volatile memory settings in turn. Refer to Section 3.4.16 for further details of the scan list.

3.8.14.3 The SCAN CONT command causes the 1250 to resume scanning the channels on the scan list after pausing at a break point in the scan list. The

1250 will continue to scan until it reaches a break point on the scan list or it receives the SCAN OFF command.

### 3.8.15 SETUP <slotnumber>.<seqmode>

3.8.15.1 This command is used to control the sequence in which a switch modules relays are opened and closed. The sequence modes (<seqmode>s) are IMM (Immediate), BBM (Break-before-make) and MBB (Make-before-break).

3.8.15.2 The Immediate (IMM) sequence mode will cause the opening and closing of switching module channels as quickly as possible, and the sequence of opening and closing is indeterminate. Care must be taken to avoid potentially damaging connections while the switching module is in a state of transition, (e.g.) short circuiting power supplies to ground, connecting high power outputs together or applying excessive power to low impedance inputs.

3.8.15.3 The Break-before-make (BBM) sequence mode causes existing channel closures to be opened before new channel closures are made. BBM is the default (power up) state.

3.8.15.4 The Make-before-break (MBB) sequence mode causes new channel closures to be executed before existing channel closures are opened.

### 3.8.16 SLIST <scan list>

where <scan list> is <slotnumber>.<channel> [;<slotnumber>.<channel>];....

3.8.16.1 This command enters the slot and channel information to be used in the scan list while in the SCAN mode. The <scanlist> describes the channels that are to be closed in the order given in the scan list. The closures are made on receipt of a trigger pulse input to the rear panel TRIG IN connector or the GPIB Group Execute Trigger (GET) command. The SCAN and TRIG modes must both be ON for this to occur.

3.8.16.2 Non-volatile memory locations may be recalled in the scanlist by specifying the memory location delimited by semicolons (;) in the scan list. On reaching the non-volatile location in the scan list, any previous closures not specified in the non-volatile location are opened and the switch configuration is recalled from memory. Note that when the 1250 proceeds to the next element in the scan list, the switch closures recalled from memory are not opened.

3.8.16.3 The range of values of <slotnumber> is from 1 to 5. Switching channels are closed if <channel> is a module specific statement. If a non volatile memory setting is to be recalled, <channel> must have an integer value between 1 and 47.

NOTE

1250 Universal Switch Controllers containing operating systems at level 13.1 or lower have 63 non-volatile memory locations available. The operating system level installed may be obtained with the command "PDATAOUT 0".

3.8.16.4 A break point in the scan list will cause the 1250 to stop scanning after opening the previous channel. A break point in the scan list is defined as the character zero (0), delimited by semi-colons (;0;). On reaching a scanlist break point, the scan mode is set to SCAN OFF. Scanning is resumed only after receipt of the SCAN CONT or SCAN ON commands. SCAN CONT will cause the 1250 to resume scanning from the scan list break point it was paused at and the SCAN ON command will cause the 1250 to resume scanning from the beginning of the scan list.

3.8.16.5 If the 1250 pauses at a scan list break point, bit 4 of the GPIB status byte, Scan list at break point, is asserted and SRQ asserted if the SRQMASK permits. Refer to Section 3.8.17 for further details of the SRQMASK command.

### 3.8.17 SRQMASK <integer>

3.8.17.1 This command controls the circumstances under which the 1250 will assert SRQ by masking the 1250 status byte. The mask value, <integer> is the decimal equivalent of the binary weighted eight bit byte ANDED with the status byte, (i.e.) if a bit in the mask is a logic 1, then the assertion of the corresponding bit in the status byte will cause the 1250 to assert SRQ. Refer to Table 3-4 for the bit assignments of the 1250 GPIB Status byte. Note that the status byte also details the possible responses of the 1250 to a GPIB serial poll.

| Bit Number | Description |
|---|---|
| 1 (lsb) | Unused |
| 2 | Unused |
| 3 | Unused |
| 4 | Scan list at break point |
| 5 | Ready |
| 6 | Programming error |
| 7 | Service requested |
| 8 (msb) | Unused |

Table 3-4, 1250 Status Byte

3.8.17.2 The Programming error bit cannot be masked and so the range of values for <integer> is 32-63, 96-127, 160-191 and 224-255.

3.8.17.3 The power up (default) value of the SRQMASK is 44, (i.e.) Programming error and Scanlist at break point will cause SRQ to be asserted.

**3.8.18 STORE <non-vol location> where <non-vol location> = 1|2|.....|47**

3.8.18.1 This command will store the present state of all switch modules resident in the 1250 chassis in the non-volatile memory location specified.

NOTE

1250 Universal Switch Controllers containing operating systems at level 13.1 or lower have 63 non-volatile memory locations available. The operating system level installed may be obtained with the command "PDATAOUT 0".

**3.8.19 TEST 0.<testnumber> where <testnumber>::=1|2|3**

3.8.19.1 This command causes the 1250 to carry out a self test. The possible tests are:

1 - Non-destructive RAM test
2 - EPROM checksum test
3 - Non-destructive non-volatile memory test

3.8.19.2 On commencing a test, the Ready bit of the status byte is reset until the test is completed.

**3.8.20 WRITE <slotnumber>.<portnumber>,<data>**

where <slotnumber> is in the range 1 - 5
<portnumber> is in the range 0 - 2
<data> is in the range 0 - 255 for 8 bit operations and +32,767 to -32,768 for 16 bit operations.

3.8.20.1 This command is supported by 1250 Series digital and breadboard cards only. It allows the system controller to write data to one of the three eight bit ports on a 1250 Series digital or breadboard module.

**3.8.21 YERR**

3.8.21.1 This command causes the 1250 to transmit the location (<slotnumber>) of the most recent error and a two digit number (<errornumber>) that describes the error. Refer to Table 3-1 for a listing of all possible values of <errornumber> and corresponding error descriptions.

NOTE

In the event of an error being generated, the GPIB SRQ line is asserted. The interrupt must be serviced remotely with either a serial poll or locally with the RESET key before the YERR command can be used. Any attempt to use the YERR command without servicing the interrupt will cause the GPIB to lock up, unless a timeout condition has been set.

| <errornumber> | Error Description |
|---|---|
| 0 | No error |
| 1 | Invalid module number specified |
| 2 | Specified module not installed |
| 3 | Invalid channel number specified |
| 4 | Invalid port number specified |
| 5 | Command syntax error |
| 6 | Read value larger than expected |
| 7 | Function not supported by module |
| 8 | Expected line terminator not found |
| 9 | Valid command not found |
| 20 | Exclude list too long |
| 21 | Channel entered on exclude list twice |
| 22 | Module doesn't allow exclude function |
| 23 | Scan list too long |
| 24 | Module doesn't allow scan |
| 25 | Equate list too long |
| 26 | Module entered on equate list twice |
| 27 | Incompatible modules equated or digital modules invalid |
| 31 | SRQMASK invalid |
| 40 | Number invalid as a test number |
| 41 * | RAM test failure |
| 42 * | ROM test failure |
| 43 * | Non-vol memory test failure |
| 44 * | Incompatible operating system EPROMS, software revisions |
| 45 * | Self-test CPU or related circuitry failure |
| 46 * | Self-test 13 V supply failure |
| 47 * | Self-test timer chip failure |
| 48 * | Insufficient RAM for option module |
| 49 * | Checksum error reading from option module EPROM |
| 50 * | Option module EPROM incompatible with CPU EPROM |
| 51 | Failed confidence test |
| 55 | Error STOREing to non-vol memory |
| 56 | Error RECALLing from non-vol memory |
| 57 | Non-vol storage location number out of range |
| 58 | RECALLing from an empty non-vol location not allowed |
| 99 | Passed Confidence Test |

Note: * denotes a 'fatal' error

**Table 3-5, 1250 Series Error Codes**

## 3.9 1250 Series Module Specific Syntax

### 3.9.1 1250-10 Breadboard Module Specific Syntax

3.9.1.1 The 1250-10 supports the READ, WRITE, RESET and PDATAOUT commands.

3.9.1.2 The module specific syntax for the 1250-10 is of the form

<slotnumber>.<portnumber>,<data>

where <slotnumber> is the 1250 chassis slot that the 1250-10 resides in, value 1 - 5.

<portnumber> is in the range 0 - 2
<data> is in the range 0 - 255

3.9.1.3 The PDATAOUT command outputs the data which was read or written during the last transaction to or from the 1250-10. The output is of the form:

<slotnumber>.1250-10 BREADBOARD MODULE
<slotnumber>.<portnumber>,<data>
<slotnumber>.END

### 3.9.2 1250-12 Relay Actuator Module Specific Syntax Specific Syntax

3.9.2.1 The 1250-12 Relay Actuator Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.2.2 The module specific syntax for the 1250-12 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-12 resides in, value 1 - 5.

<channel> is the reference of a channel of 2 FORM A (2 SPST) relays implemented on the 1250-12.

3.9.2.3 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.2.4 The SETUP command controls the sequence mode of the 1250-12 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

3.9.2.5 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-12 RELAY ACTUATOR MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.2.6 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-12 Relay Actuator Module is as follows:

<slotnumber>.1250-12 Relay Actuator Module
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 9 for the 1250-12

### 3.9.3 1250-14 Digital Input/Output Module Specific Syntax

3.9.3.1 The 1250-14 Digital Input/Output Module supports the WRITE, READ and SETUP commands.

3.9.3.2 The WRITE command permits the writing of 8 or 16 bit data to a port, W.

3.9.3.3 The module specific syntax used with the 1250-14 in the WRITE command is of the form:

WRITE <slotnumber>.<portnumber>,<data>

where <slotnumber> is the 1250 chassis slot that the 1250-14 resides in, value 1 - 5.

<portnumber> is the port written to, value 0 - 2. Port 0 writes to the lower 8 bits of a 16 bit word, port 1 writes to the upper 8 bits of a 16 bit word and port 2 writes to all 16 bits of the word. For ports 0 and 1, each data output is the decimal equivalent of the binary data written. The range of values of data written to ports 0 and 1 is 0 - 255. For port 2, each data output is in the 2's complement form of the 16 bit word written. The range of values of data written to port 2 is +32,767 to -32,768.

Note: To convert from 2's complement to binary, invert each bit and add (binary) 1.

3.9.3.4 The module specific syntax used with the 1250-14 in the READ command is of the form:

READ <slotnumber>.<portnumber>,[<number of readings>]

where <slotnumber> and <portnumber> are the same as for the WRITE command.

<number of readings> sets the number of data words to be captured and stored by the 1250. The default value is 1, and the valid ranges for <number of readings> is 1 - 127 for 16 bit words and 1 - 254 for 8 bit words. The read rate is as defined by the SETUP command. When the data captured by the READ command is read by the system controller, it is returned over the GPIB as multiple lines of data. The number of lines returned will be the number specified in <number of readings>. The data read by the 1250-14 does not require an instruction to load the data into the GPIB output buffer, but may be read over the GPIB

3.9.3.5 The module specific syntax used with the 1250-14 in the SETUP command is of the form:

SETUP <slotnumber>.<modenumber>,<polarity code>

where: <slotnumber> is the same as in the WRITE command.

<modenumber> sets the 1250-14 to one of the five modes available. The range of values for <modenumber> is 1 - 5. There are three control lines used to qualify data transfers, I/O, PFLG and PCTL. The lines used in each mode are described below. Modes 1 and 2 are available at all three ports, and modes 3, 4 and 5 are available at ports 0 and 2 only.

Mode 1 is Static Mode 1. This mode will clear the data written to the output port when a READ command is issued. It causes data to be read synchronously, at a nominal 1 kHz rate. The I/O line is active as a data direction indicator. This mode is the default power up mode employed by the 1250-14.

Mode 2 is Static Mode 2. This mode permits the reading of data previously written to the output port, otherwise it is the same as mode 1. Multiple READs are carried out at a nominal 1 kHz rate.

Mode 3 is Strobe Mode 1. This mode uses the I/O line to indicate data direction and the PCTL line to output a strobe to trigger data transfer. Multiple READs are carried out at a nominal 1 kHz rate.

Mode 4 is Strobe Mode 2. This mode uses the WR line as the write data strobe and the RD line is the read data strobe. The I/O line is used to indicate data direction. Multiple READs are carried out at a nominal 1 kHz rate.

Mode 5 is the Handshake mode. This carries out all data transfers using a three wire handshake. The lines used are I/O, PFLG and PCTL. Both single and multiple READs are carried out at the speed of the slowest handshake line.

<polarity code> sets the logic levels that are to be interpreted as true and false. The default value is P=0. The decimal number entered is the weighted sum of the following:

P=1 The lower byte polarity is low true. P=0 sets the lower byte polarity to high true.

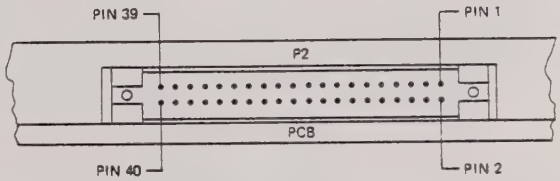
P=4 The upper byte polarity is low true. P=0 sets the upper byte polarity to high true.

P=2 PCTL polarity is low busy. P=0 sets the PCTL polarity to low ready.

P=16 PFLG polarity is low busy. P=0 sets the PFLG polarity to low ready.

P=8 I/O polarity is low input. P=0 sets the I/O polarity to low output.

| PIN | |
|---|---|
| 1 | GND |
| 2 | GND |
| 3 | H7 |
| 4 | GND |
| 5 | H6 |
| 6 | GND |
| 7 | H5 |
| 8 | GND |
| 9 | H4 |
| 10 | GND |
| 11 | H3 |
| 12 | GND |
| 13 | H2 |
| 14 | GND |
| 15 | H1 |
| 16 | GND |
| 17 | H0 |
| 18 | GND |




H0 – H7 ARE BITS OF HIGH ORDER BYTE
L0 – L7 ARE BITS OF LOW ORDER BYTE

| PIN | |
|---|---|
| 19 | L7 |
| 20 | GND |
| 21 | L6 |
| 22 | GND |
| 23 | L5 |
| 24 | GND |
| 25 | L4 |
| 26 | GND |
| 27 | L3 |
| 28 | GND |
| 29 | L2 |
| 30 | GND |
| 31 | L1 |
| 32 | GND |
| 33 | L0 |
| 34 | GND |
| 35 | I/$\bar{O}$ |
| 36 | GND |
| 37 | PFLG |
| 38 | PCTL |
| 39 | GND |
| 40 | GND |

### 3.9.4 1250-15 Relay Driver Module Specific Syntax

3.9.4.1 The 1250-15 Relay Driver Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.4.2 The module specific syntax for the 1250-15 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-15 resides in, value 1 - 5.

<channel> is the reference of a channel that is to be used to actuate a relay external to the 1250-15. The range of values for <channel> is 0 - 19.

3.9.4.3 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.4.4 The SETUP command controls the sequence mode of the 1250-60 and 1250-61 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

3.9.4.5 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-15 RELAY ACTUATOR MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.4.6 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

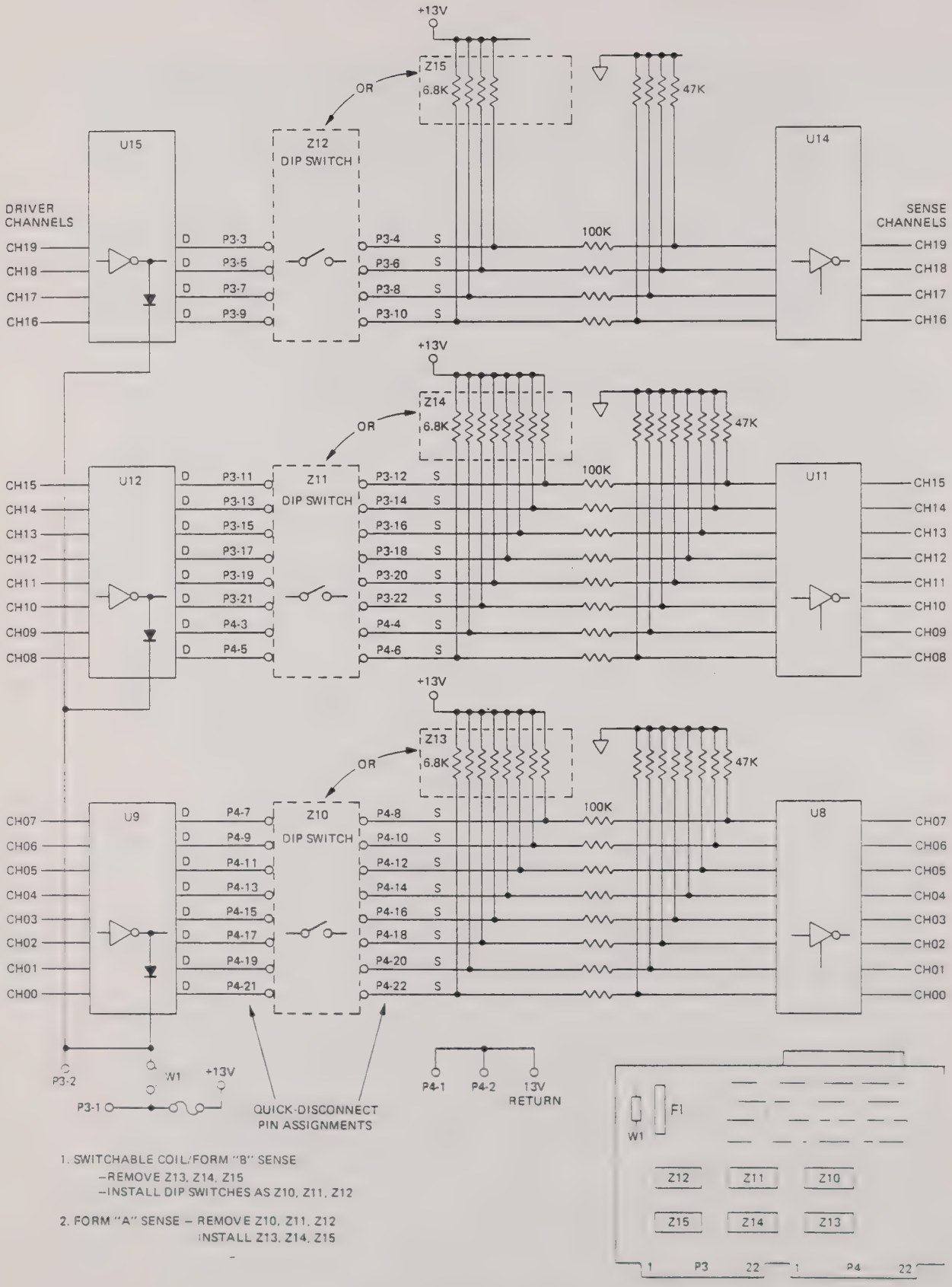
PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-15 RELAY ACTUATOR MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

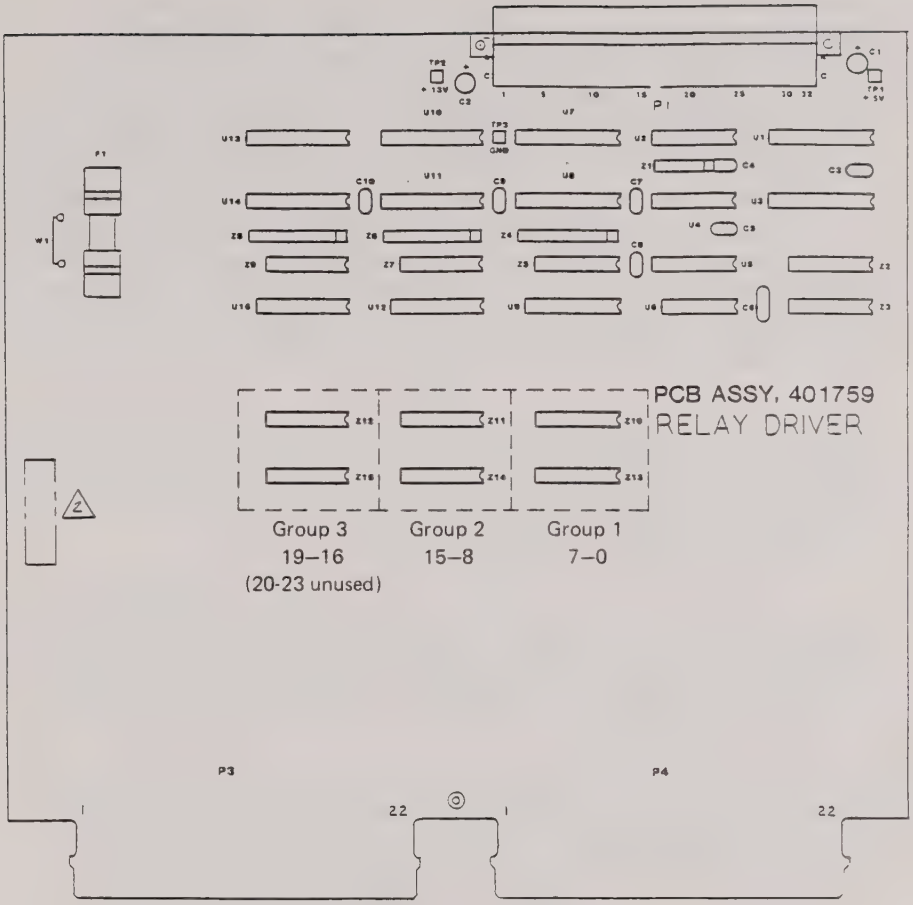
where <channel> is 0 - 19 for the 1250-15.




1. SWITCHABLE COIL/FORM "B" SENSE
   –REMOVE Z13, Z14, Z15
   –INSTALL DIP SWITCHES AS Z10, Z11, Z12

2. FORM "A" SENSE – REMOVE Z10, Z11, Z12
   INSTALL Z13, Z14, Z15

**1250–15 Relay Driver Connection Diagram**




This example of Form A, B, and C sensing uses the 3 different channel groups 1, 2, and 3 on Relay Driver PCB shown above. See text for configuring to meet your particular needs.

Sensing Examples:

| FORM A | FORM B | FORM C |
|---|---|---|
| DIP Switches* | Empty | Z-block |
| Z-block | Empty | Empty |

* Switches "ON" will provide confidence mode feedback.
Switches "OFF" user must provide external sense to pass confidence mode.

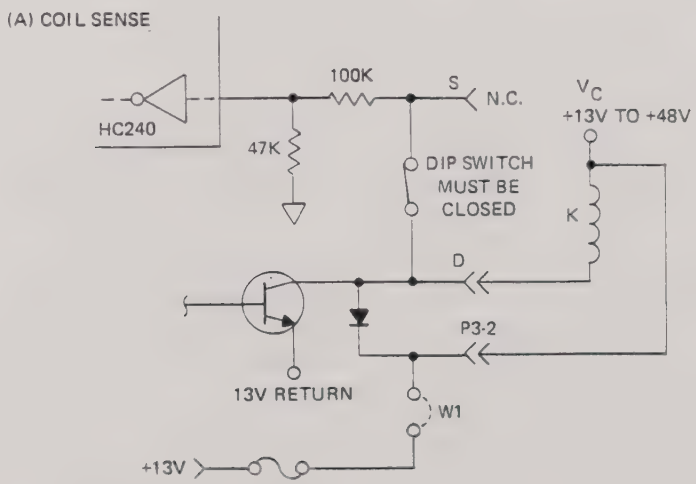
**1250–15 Relay Driver Connection Diagram (Cont'd)**

### 3.9.4.7 1250-15 Confidence Mode Support

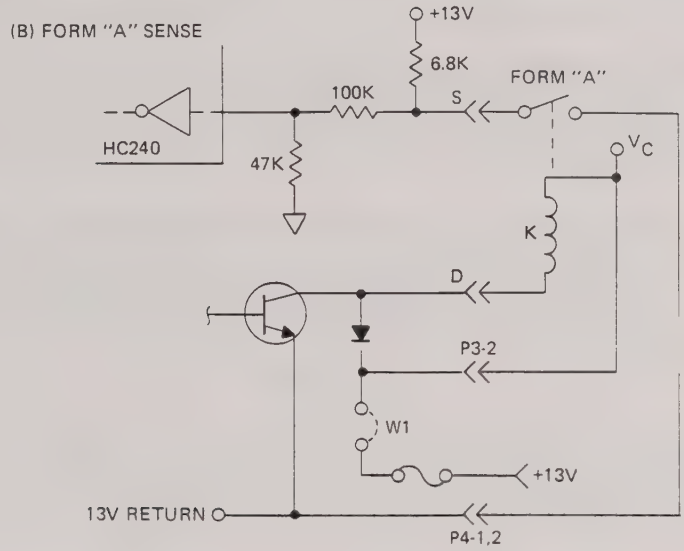
3.9.4.7.1 The 1250-15 may be configured to support confidence testing in one or more ways, depending on the types of relays that the card is driving and the users requirements. Two types of confidence testing are available, coil current sensing and spare contact sensing. The spare contact sensing is available only if the relay is a DPDT type with one of the pair of contacts unused and the exact configuration depends on whether the relay is normally open or normally closed. More than one type of confidence test may be implemented on a single board and Racal-Dana recommend that channels 0 - 7, 8 - 15 and 16-19 have one type of confidence feedback per group implemented.

3.9.4.7.2 The 1259-15 is factory configured with DIP switches installed in sockets Z10, Z11 and Z12. These simulate the FORM A sense mode and allow the 1250-15 to pass the confidence mode test without external connections. If external relays are connected, the DIP switches must be removed or switched off and external coil or contact feedback supplied.

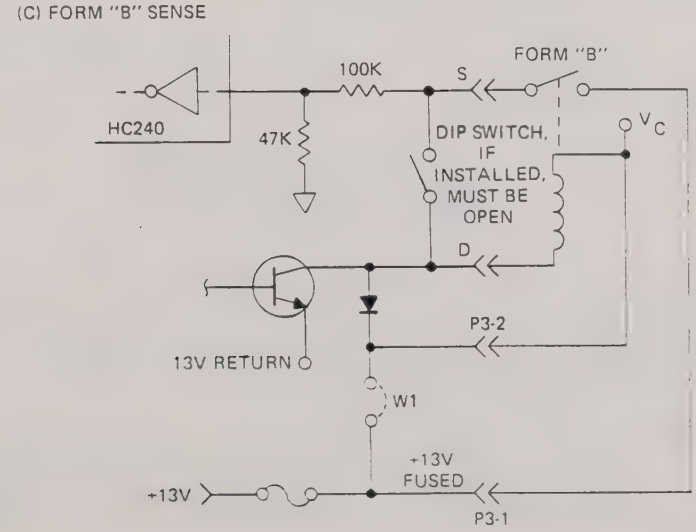
3.9.4.7.3 To implement coil current sensing, remove resistor blocks Z13, Z14 and Z15 from the 1250-15 and install them in the sockets for Z10, Z11 and Z12. Connect the relay coil to pins D and P3-2 on the 1250-15. Fit jumper W1 if it is required to use the 1250 internal +13 V supply to supply the relay coil current, as shown below.



To implement FORM A (normally open) sensing, remove resistor blocks Z10, Z11 and Z12 from the 1250-15 and install them in the sockets for Z13, Z14 and Z15. Connect the relay coil to pins D and P3-2 on the 1250-15 and the unused switch contacts to pins S and P4-1,2. Fit jumper W1 if it is required to use the 1250 internal +13 V supply to supply the relay coil current as shown below.




To implement FORM B (normally closed) sensing, remove resistor blocks Z13, Z14, Z15, Z10, Z11 and Z12 from the 1250-15. Connect the relay coil to pins D and P3-2 on the 1250-15 and the unused switch contacts to pins S and P3-1. Fit jumper W1 if it is required to use the 1250 internal +13 V supply to supply the relay coil current.



### 3.9.5 1250-16 High Density Signal Switching Module Specific Syntax

3.9.5.1 The 1250-16 High Density Signal Switching Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.5.2 The module specific syntax for the 1250-16 is of the form:

OPEN <slotnumber>.<port>[;<slotnumber>.<port>].....

where <slotnumber> is the 1250 chassis slot that the 1250-16 resides in, value 1 - 5.

<port> is a 12 wire port, each wire of which is to be switched. Any port may be selected as the 'common' terminal and each port closed individually, as required. The range of values for <port> is 00 - 05. Note that <port> = 05 connects the 1250-16 to the analog bus.

CAUTION

The analog bus only supports 10 wire operation and so two of the 12 wires switched by the 1250-16 are not connected to the analog bus if port 5 is closed.

3.9.5.3 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.5.4 The SETUP command controls the sequence mode of the 1250-16 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

3.9.5.5 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module

resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-16 switch module is as follows:

<slotnumber>.1250-16 HIGH DENSITY SIGNAL SWITCHING MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.5.6 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

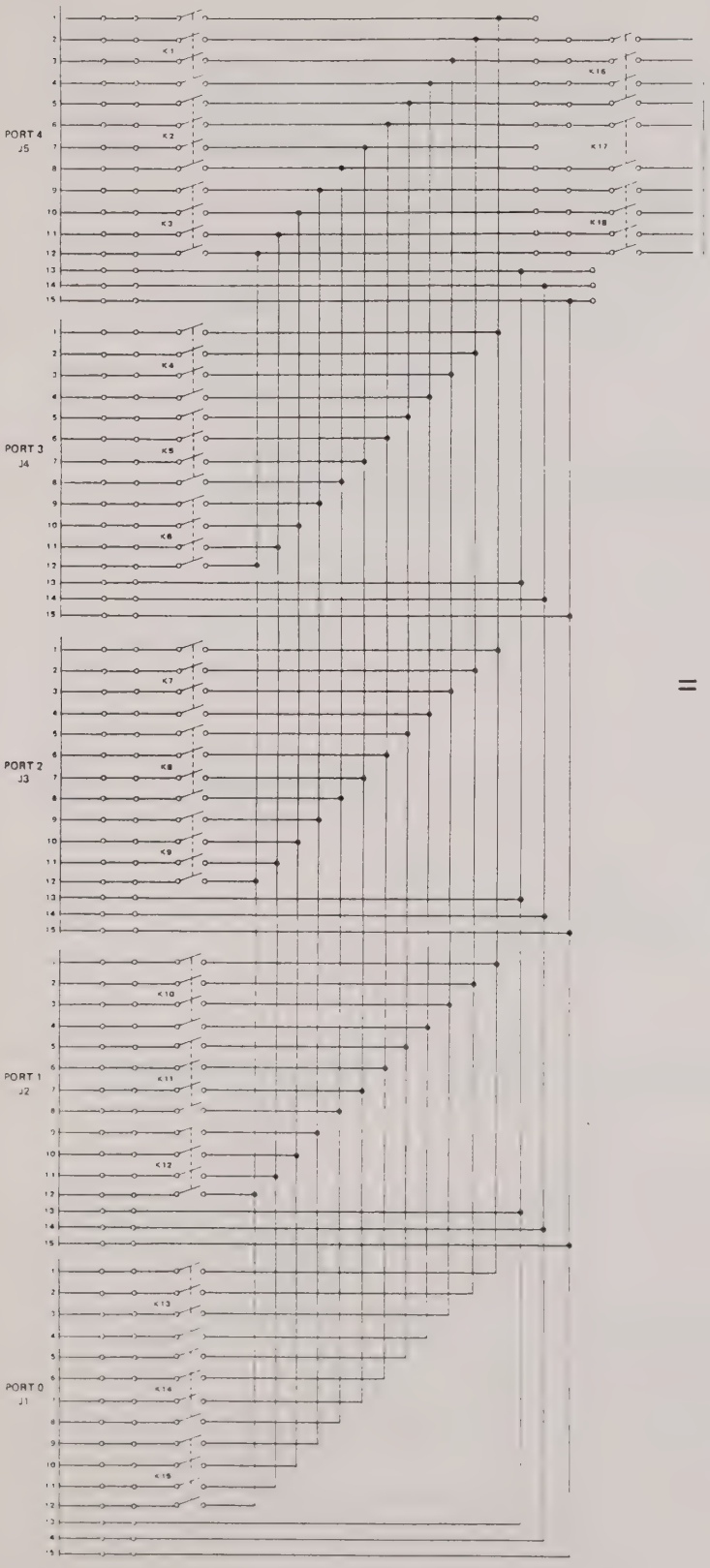
PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-16 Module is as follows:

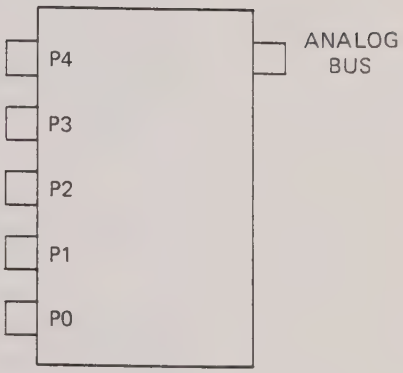
<slotnumber>.1250-16 HIGH DENSITY SIGNAL SWITCHING MODULE
<slotnumber>.<port>[,<port>][,<port>].....
<slotnumber>.END

where <port> is 0 - 5 for the 1250-16




1250-16 HIGH DENSITY SIGNAL SWITCHING MODULE

=




1250-16

DETAIL A – 1250-16

### 3.9.6 1250-20 Relay Power Module Specific Syntax

3.9.6.1 The 1250-20 Relay Power Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.6.2 The module specific syntax for the 1250-20 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-20 resides in, value 1 - 5.

<channel> is the reference of a 2 FORM A (2 SPST) relays implemented on the 1250-20. The range of values for <channel> is 0 - 9.

3.9.6.3 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.6.4 The SETUP command controls the sequence mode of the 1250-20 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

3.9.6.5 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-20 Relay Power modules are as follows:

<slotnumber>.1250-20 RELAY POWER MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.6.6 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

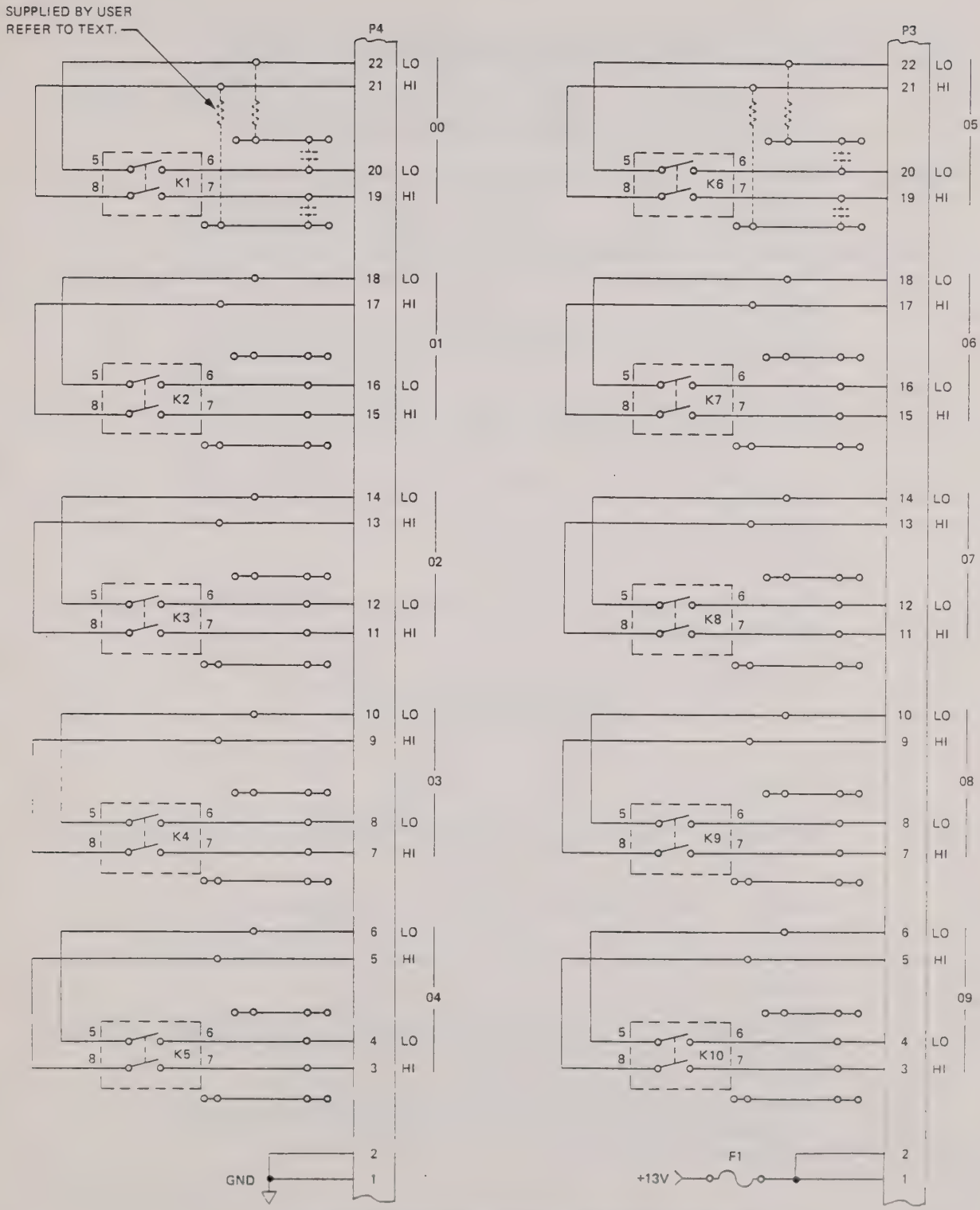
PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-20 Relay Power Module is as follows:

<slotnumber>.1250-20 RELAY POWER MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 9 for the 1250-20




**1250-20 Relay Power Module Connection Diagram**

### 3.9.7 1250-30 Scanner / Multiplexer Module Specific Syntax

3.9.7.1 The 1250-30 Scanner / Multiplexer Module Supports the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.7.2 The module specific syntax for the 1250-30 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-30 resides in, value 1 - 5.

<channel> is the reference of the channel implemented in the 1250-30.

3.9.7.3 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.7.4 The SETUP command controls the sequence mode of the 1250-30 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

3.9.7.5 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-30 Scanner/ Multiplexer modules are as follows:

<slotnumber>.1250-30 SCANNER / MULTIPLEXER MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.7.6 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

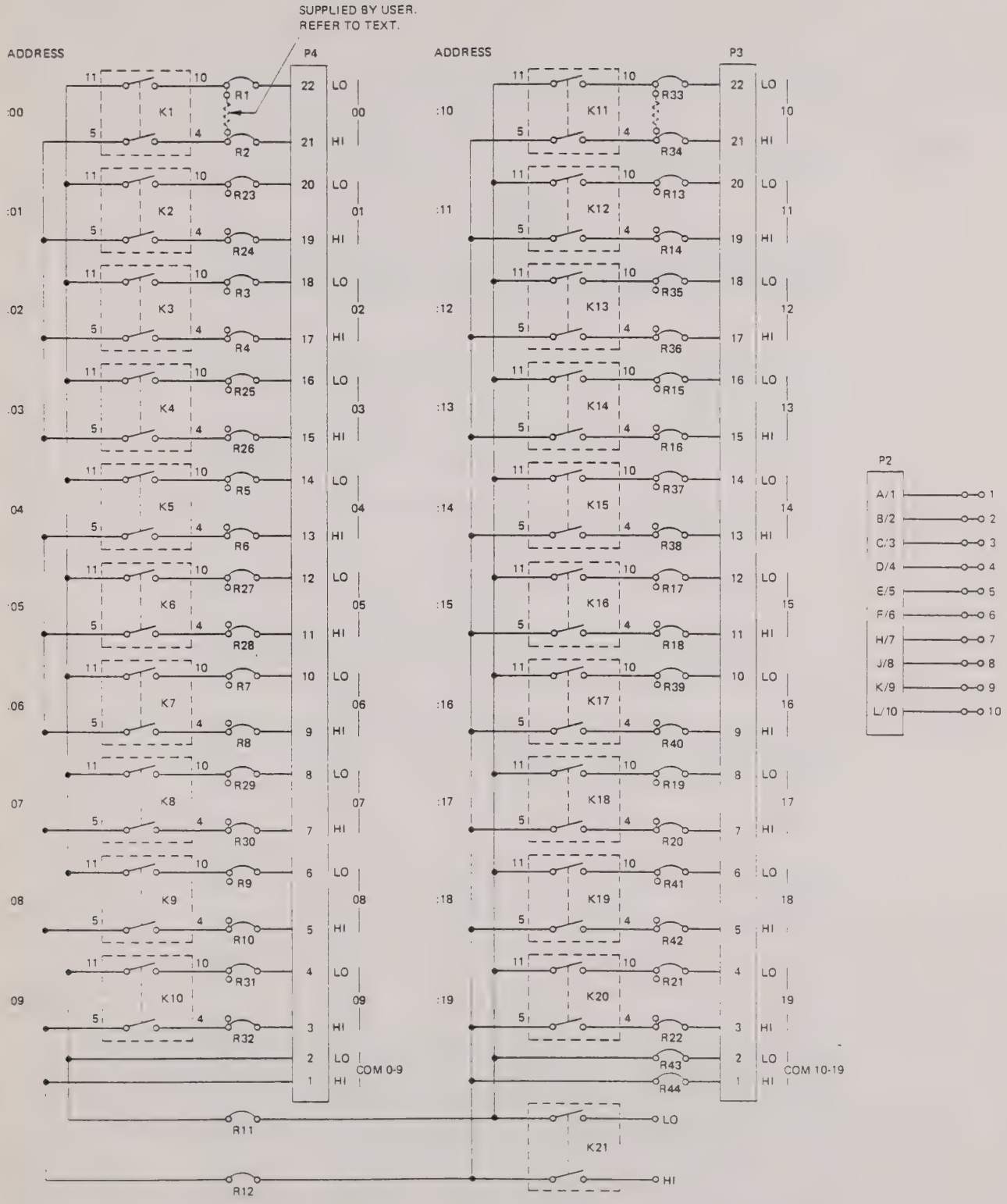
PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The response to the PDATAOUT command for the 1250-30 Scanner / Multiplexer Module is as follows:

<slotnumber>.1250-30 SCANNER / MULTIPLEXER MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 - 19 for the 1250-30.




**1250-30 Scanner/Multiplexer Connection Diagram**

### 3.9.8 1250-35 Module Specific Syntax

3.9.8.1 The 1250-35 supports the OPEN, CLOSE, SETUP, PSETUP, PDATAOUT and RESET commands.

**NOTE**

The 1250-35 is supported by 1250 operating systems at rev. Levels 14.1 And above.

3.9.8.2 The module specific syntax for the 1250-35 is divided into three sections. The section to be used is dependant on the configuration implemented for the switching module.

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>;.....]

where <slotnumber> is 1 - 5. It describes the chassis slot that the 1250 Series module is resident in.

<channel> is the reference of the channel to be closed.

In a four wire mode, the range of values for <channel> is 0 - 23.
In a two wire mode, the range of values for <channel> is 0 - 47.
In a one wire mode, the range of values for <channel> is 0 - 95.

3.9.8.3 The 4, 2 or 1 wire mode of the 1250-35 is set by jumpers on the switching module PCB. To select a particular mode, set jumpers W15 and W16 to connect the jumper pins as follows:

| | W15 | W16 |
|---|---|---|
| Four wire | 1 to 2 | 1 to 2 |
| Two wire | 2 to 3 | 1 to 2 |
| One wire | 1 to 2 | 2 to 3 |

**CAUTION**

If jumpers W15 and W16 are both set to connect pins 2 to 3, an illegal state occurs and the 1250-35 will default to a four wire mode of operation. The configuration of the 1250-35 is determined by jumper pairs W1 to W14, and so if the hard wired configuration and the mode of operation are in conflict, the overall 1250-35 configuration is indeterminate.

3.9.8.4 In the one wire mode, the scanner output is always connector J2, Pin N. The

inputs selected and deselected by OPEN <channel> and CLOSE <channel> commands are as follows for each value of <channel>:

| <channel> | Connector | Pin |
|---|---|---|
| 0 | J1 | DD |
| 1 | J1 | v |
| 2 | J1 | k |
| 3 | J1 | a |
| 4 | J1 | S |
| 5 | J1 | H |
| 6 | J3 | DD |
| 7 | J3 | v |
| 8 | J3 | k |
| 9 | J3 | a |
| 10 | J3 | S |
| 11 | J3 | H |
| 12 | J1 | z |
| 13 | J1 | r |
| 14 | J1 | e |
| 15 | J1 | W |
| 16 | J1 | M |
| 17 | J1 | C |
| 18 | J3 | z |
| 19 | J3 | r |
| 20 | J3 | e |
| 21 | J3 | W |
| 22 | J3 | M |
| 23 | J3 | C |
| 24 | J1 | AA |
| 25 | J1 | s |
| 26 | J1 | f |
| 27 | J1 | X |
| 28 | J1 | N |
| 29 | J1 | D |
| 30 | J3 | EE |
| 31 | J3 | w |
| 32 | J3 | m |
| 33 | J3 | b |
| 34 | J3 | T |
| 35 | J3 | J |
| 36 | J1 | EE |
| 37 | J1 | w |
| 38 | J1 | m |
| 39 | J1 | b |
| 40 | J1 | T |

| | | |
|---|---|---|
| 41 | J1 | J |
| 42 | J3 | AA |
| 43 | J3 | s |
| 44 | J3 | f |
| 45 | J3 | X |
| 46 | J3 | N |
| 47 | J3 | D |
| 48 | J1 | BB |
| 49 | J1 | t |
| 50 | J1 | h |
| 51 | J1 | Y |
| 52 | J1 | P |
| 53 | J1 | E |
| 54 | J3 | BB |
| 55 | J3 | t |
| 56 | J3 | h |
| 57 | J3 | Y |
| 58 | J3 | P |
| 59 | J3 | E |
| 60 | J1 | x |
| 61 | J1 | n |
| 62 | J1 | c |
| 63 | J1 | U |
| 64 | J1 | K |
| 65 | J1 | A |
| 66 | J3 | x |
| 67 | J3 | n |
| 68 | J3 | c |
| 69 | J3 | U |
| 70 | J3 | K |
| 71 | J3 | A |
| 72 | J1 | y |
| 73 | J1 | p |
| 74 | J1 | d |
| 75 | J1 | V |
| 76 | J1 | L |
| 77 | J1 | B |
| 78 | J3 | CC |
| 79 | J3 | u |
| 80 | J3 | j |
| 81 | J3 | Z |
| 82 | J3 | R |
| 83 | J3 | F |
| 84 | J1 | CC |
| 85 | J1 | u |
| 86 | J1 | j |
| 87 | J1 | Z |

| | | |
|---|---|---|
| 88 | J1 | R |
| 89 | J1 | F |
| 90 | J3 | y |
| 91 | J3 | p |
| 92 | J3 | d |
| 93 | J3 | V |
| 94 | J3 | L |
| 95 | J3 | B |

**NOTE**

In the One wire mode, channels 0-47 and 48-95 are mutually exclusive if more than one input is to be selected at one time. This is because the 1250-35 uses double pole, double throw relays which are mechanically ganged together and selects between the high and low sides of the relays.

**Example:** Channel 0 is the high side of K1 and channel 50 is the low side of K3. As the 1250-35 selects between the high and low sides of its relays, it cannot select both high and low sides. Closing channel 0 while channel 95 is closed will result in the selection of the relays high side, which will open channel 95 and close channel 48.

3.9.8.5 In the two wire modes, there are several scanner outputs available, depending on the configuration selected. Refer to Figure 3-2 for the outputs available in the various two wire configurations. The inputs selected by CLOSE <channel> commands are as follows for each value of <channel>:

| <channel> | Connector | Pins |
|---|---|---|
| 0 | J1 | DD and BB |
| 1 | J1 | v and t |
| 2 | J1 | k and h |
| 3 | J1 | a and Y |
| 4 | J1 | S and P |
| 5 | J1 | H and E |
| 6 | J3 | DD and BB |
| 7 | J3 | v and t |
| 8 | J3 | k and h |
| 9 | J3 | a and Y |
| 10 | J3 | S and P |
| 11 | J3 | H and E |
| 12 | J1 | z and x |
| 13 | J1 | r and n |
| 14 | J1 | e and c |
| 15 | J1 | W and U |
| 16 | J1 | M and K |
| 17 | J1 | C and A |
| 18 | J3 | z and x |
| 19 | J3 | r and n |
| 20 | J3 | e and c |
| 21 | J3 | W and U |
| 22 | J3 | M and K |
| 23 | J3 | C and A |
| 24 | J1 | AA and w |
| 25 | J1 | s and p |
| 26 | J1 | f and d |
| 27 | J1 | X and V |
| 28 | J1 | N and L |
| 29 | J1 | D and B |
| 30 | J3 | EE and CC |
| 31 | J3 | w and u |
| 32 | J3 | m and j |
| 33 | J3 | b and z |
| 34 | J3 | T and R |
| 35 | J3 | J and F |
| 36 | J1 | EE and CC |
| 37 | J1 | w and u |
| 38 | J1 | m and j |

| | | |
|---|---|---|
| 39 | J1 | b and Z |
| 40 | J1 | T and R |
| 41 | J1 | J and F |
| 42 | J3 | AA and y |
| 43 | J3 | s and p |
| 44 | J3 | f and d |
| 45 | J3 | X and V |
| 46 | J3 | N and L |
| 47 | J3 | D and B |

3.9.8.6 In the four wire modes, there are several scanner outputs available, depending on the configuration selected. Refer to Figure 3-3 for the outputs available in the various four wire configurations. The inputs selected by CLOSE <channel> commands are as follows for each value of <channel>:

| <channel> | Connector | Pins | Connector | Pins |
|---|---|---|---|---|
| 0 | J1 | DD and BB | J3 | DD and BB |
| 1 | J1 | v and t | J3 | v and t |
| 2 | J1 | k and h | J3 | k and h |
| 3 | J1 | a and Y | J3 | a and Y |
| 4 | J1 | S and P | J3 | S and P |
| 5 | J1 | H and E | J3 | H and E |
| 6 | J1 | z and x | J3 | z and x |
| 7 | J1 | r and n | J3 | r and n |
| 8 | J1 | e and c | J3 | e and c |
| 9 | J1 | W and U | J3 | W and U |
| 10 | J1 | M and K | J3 | M and K |
| 11 | J1 | C and A | J3 | C and A |
| 12 | J1 | AA and y | J3 | EE and CC |
| 13 | J1 | s and p | J3 | w and u |
| 14 | J1 | f and d | J3 | m and j |
| 15 | J1 | X and V | J3 | b and Z |
| 16 | J1 | N and L | J3 | T and R |
| 17 | J1 | D and B | J3 | J and F |
| 18 | J1 | EE and CC | J3 | AA and y |
| 19 | J1 | w and u | J3 | s and p |
| 20 | J1 | m and j | J3 | f and d |
| 21 | J1 | b and Z | J3 | X and V |
| 22 | J1 | T and R | J3 | N and L |
| 23 | J1 | J and F | J3 | D and B |

3.9.8.7 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.8.8 The SETUP command controls the relay sequence mode of the 1250-35 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is 1 - 5. It describes the chassis slot that the 1250 Series module is resident in.

<seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

The default value for <seqmode> is BBM.

3.9.8.9 The PSETUP command causes the specified module setup to be transmitted over the GPIB to the 1250s controller. The syntax used is:

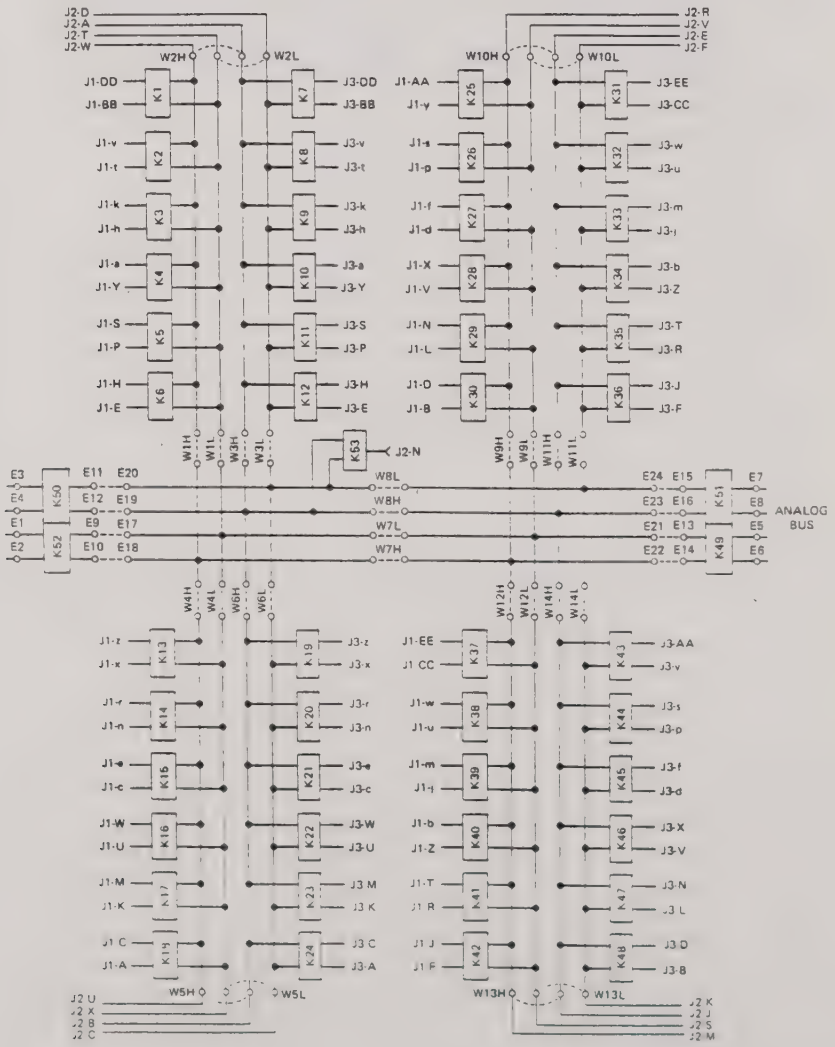
PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

### 3.9.8.10 1250-35 Configuration Setting

3.9.8.10.1 The 1250-35 configuration is set by the addition of jumper wires to the 1250-35 PCB. The following Table gives the jumpers necessary to configure the 1250-35 in all of its configurations. An X indicates that the jumper is to be fitted and an (X) indicates that the jumper is optional, depending on whether access to the Analog bus is required.

3.9.8.10.2 Jumper pairs W1 to W14 set the 1250-35 switching topology and moveable jumpers W15 and W16 control the 1250-35 ID byte. This ID byte informs the 1251 whether the 1250-35 is in a 1, 2 or 4 wire configuration

3.9.8.10.3 The 1250-35 is despatched from the factory with no jumpers fitted except jumpers W15 and W16, which are both in positions connecting pins 1 to 2. This is the 4 (1 x 6) four wire configuration.



| | 4(1x6) 4 wire | 4(1x12) 2 wire | 2(1x12) 4 wire | 8(1X6) 2 wire | 2(1x24) 2 wire | 1(1x24) 4 wire | 1(1x48) 2 wire | 1(1x96) 1 wire |
|---|---|---|---|---|---|---|---|---|
| W1L | | (X) | X | (X) | X | X | X | X |
| W1H | | (X) | X | (X) | X | X | X | X |
| W2L | | X | | | X | | X | X |
| W2H | | X | | | X | | X | X |
| W3L | | | X | | X | X | X | X |
| W3H | | | X | | X | X | X | X |
| W4L | | | X | | X | X | X | X |
| W4H | | | X | | X | X | X | X |
| W5L | | X | | | X | | X | X |
| W5H | | X | | | X | | X | X |
| W6L | | (X) | X | (X) | X | X | X | X |
| W6K | | (X) | X | (X) | X | X | X | X |
| W7L | | | | | | X | X | X |
| W7H | | | | | | X | X | X |
| W8L | | | | | | X | X | X |
| W8H | | | | | | X | X | X |
| W9L | | (X) | X | (X) | X | X | X | X |
| W9H | | (X) | X | (X) | X | X | X | X |
| W10L | | X | | | X | | X | X |
| W10H | | X | | | X | | X | X |
| W11L | | | X | | X | X | X | X |
| W11H | | | X | | X | X | X | X |
| W12L | | | X | | X | X | X | X |
| W12H | | | X | | X | X | X | X |
| W13L | | X | | | X | | X | X |
| W13H | | X | | | X | | X | X |
| W14L | | (X) | X | (X) | X | X | X | X |
| W14H | | (X) | X | (X) | X | X | X | X |
| W15 | 1 to 2 2 to 3 | | 2 to 3 | 1 to 2 | 2 to 3 | 1 to 2 | 2 to 3 | 1 to 2 |
| W16 | 1 to 2 1 to 2 | | 1 to 2 | 1 to 2 | 1 to 2 | 1 to 2 | 1 to 2 | 2 to 3 |

### 3.9.8.11 Analog Bus Support

3.9.8.11.1 The 1250-35 may be configured to access the analog bus by the fitting of jumpers. This access may be via relays or hard wired, depending on the jumpers fitted.

3.9.8.11.1.1 To access the analog bus via relays, fit 24-gauge twisted pairs to the 1250-35 as follows:

E17 to E9 and E18 to E10

E19 to E4 and E20 to E3

E21 to E13 and E22 to E14

E23 to E8 and E24 to E7

3.9.8.11.1.2 To connect and disconnect the 1250-35 to and from the Analog bus, the OPEN and CLOSE commands are used. The values of <channel> used are as follows:

In a four wire mode, <channel> is in the range 24 - 27.
In a two wire mode, <channel> is in the range 48 - 51.
In a one wire mode, <channel> is in the range 96 - 99.

<channel> values 24 - 27, 48 - 51 and 96 - 99 close relays K49 - 52, respectively.

Note that all four relays must be closed to connect the 1250-35 to the Analog bus completely. Each relay connects two wires to the Analog bus. This allows the connection of selected wires to the Analog bus if desired.

3.9.8.11.2 To hard wire permanent access to the analog bus, fit 24-gauge jumpers to the 1250-35 as follows:

E17 to E1 and E18 to E2

E19 to E3 and E20 to E4

E21 to E5 and E22 to E6

E23 to E7 and E24 to E8

3.9.8.11.3 Note that Analog bus access is not supported in the 4 (1 x 6) four wire

configuration. The fitting of jumpers to connect to the analog bus in this configuration would change the configuration of the switching module.

3.9.8.11.4 Analog bus access is supported for the 4 (1 x 12) two wire configuration only if the optional jumpers shown in the 1250-35 configuration table are installed. These jumpers are in addition to the jumpers required to access the analog bus as described above.

### 3.9.8.12 1250-35 Performance Enhancements

3.9.8.12.1 The 1250-35 path resistance may be reduced and the bandwidth available increased by short circuiting connections to J2 on the 1250-35 EXTERNAL to the 1250-35. These performance improvements arise by connecting used and unused signal paths in parallel. This reduces path resistance and causes what were previously unterminated stubs to become current carrying conductors, which removes the band-limiting effects previously caused by the stubs.

3.9.8.12.2 In a four wire mode, short circuit the following pins EXTERNAL to connector J2 for the following configurations:

| | |
|---|---|
| 4(1 x 6): | No jumpers |
| 2(1 x 12): | C and D<br>A and B<br>T and X<br>U and W<br>M and R<br>S and V<br>J and E<br>F and K |
| 1(1 x 24): | C, D, F and K<br>A, B, J and E<br>T, X, V and S<br>W, U, R and M |

3.9.8.12.3 In a two wire mode, short circuit the following pins EXTERNAL to connector J2 for the following configurations:

| | |
|---|---|
| 2(1 x 24): | D, T, X and C<br>A, W, U and B<br>M, J, R and E<br>V, F, K amd S |
| 4(1 x 12): | A and w R and E<br>D and T V and F<br>U and B j and M<br>X and C K and S |
| 1(1 x 48): | D, T, X, C, V, F, K and S<br>M, J, R, E, B, U, W and A |

3.9.8.12.4 In a one wire mode, short circuit the following pins EXTERNAL to connector J2 for the following configuration:

| | |
|---|---|
| 1 x 96: | D, T, X, C, V, F, K and S<br>M, J, R, E, B, U, W and A |

### 3.9.9 1250-40 Module Specific Syntax

3.9.9.1 The 1250-40 supports the OPEN, CLOSE, RESET, and PDATAOUT commands.

3.9.9.2 The Module Specific Syntax for the 1260-40 4 x 5 Signal Matrix module is as follows:

<slotnumber>.<rownumber><columnnumber>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<rownumber> is the matrix row to be connected to <columnnumber>, value 00 through 03.

<columnnumber> is the matrix column to be connected to <rownumber>, value 00 through 04.

The following relay control matrix gives the possible command codes used to implement row and column closures for the 1250-40.

| | | Column number | | | | |
|---|---|---|---|---|---|---|
| | | 00 | 01 | 02 | 03 | 04 |
| Row Number | 00 | 0000 | 0001 | 0002 | 0003 | 0004 |
| | 01 | 0100 | 0101 | 0102 | 0103 | 0104 |
| | 02 | 0200 | 0201 | 0202 | 0203 | 0204 |
| | 03 | 0300 | 0301 | 0302 | 0303 | 0304 |
| | 04 | 0400 | 0401 | 0402 | 0403 | 0404 |

3.9.9.3 Two digits are required to describe <rownumber> and <columnnumber>. A leading zero is added to both <rownumber> and <columnnumber>.

Example: CLOSE 3.0204

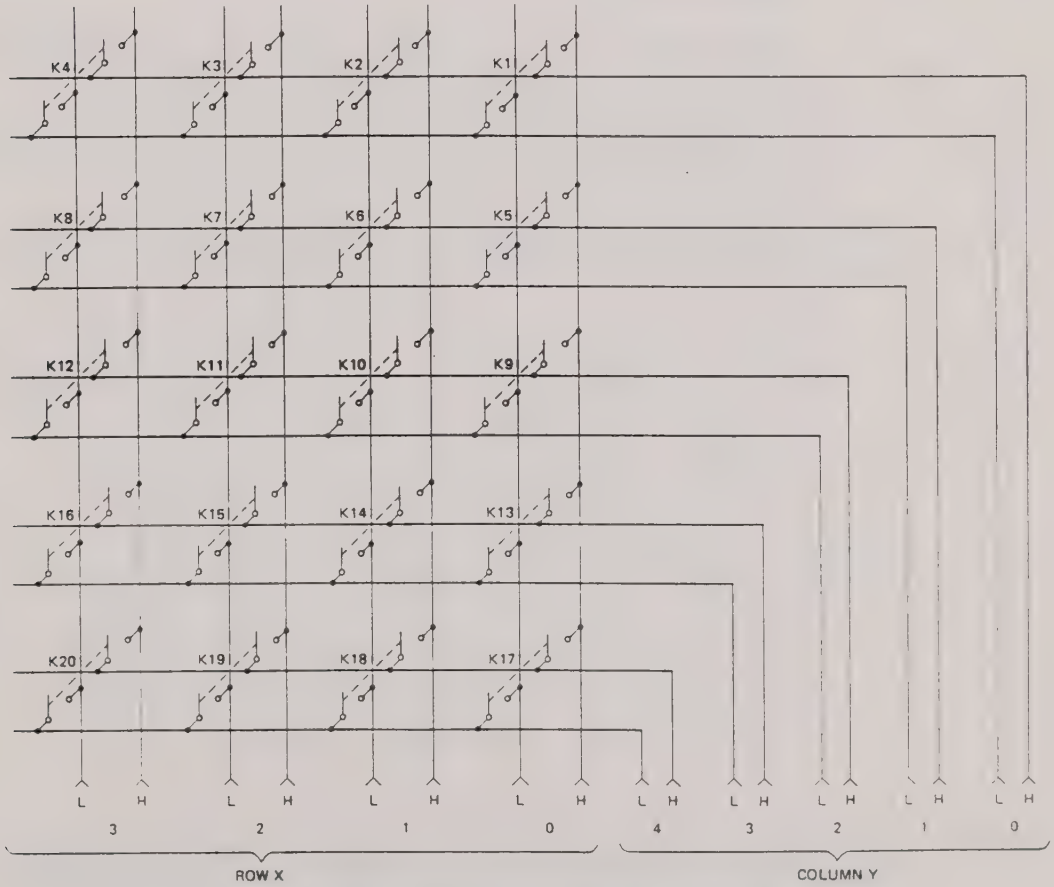
This CLOSE statement will connect row 2 to column 4 on the 1260-40 resident in 1250 slot 3.

3.9.9.4 In the case that more than one connection is to be made or broken on the 1260-40 with contiguous rows or columns, then the following format is supported:

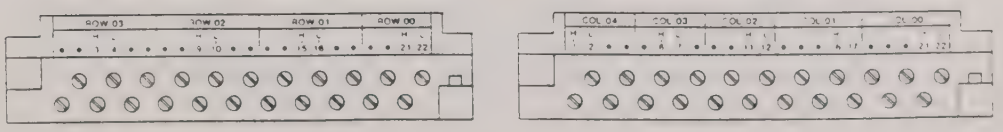
<rownumber><columnnumber>-<rownumber><columnnumber>

Example: OPEN 3.0101-0204

This OPEN statement has the same effect as a series of open commands to open all of the connections between rows from 1 through 3 and columns 1 through 4. i.e. connections 0101, 0102, 0103, 0104, 0200, 0201, 0202, 0203 and 0204 are opened.




**1250-40 Signal Matrix Module Simplified Connection Diagram**



**1250-40 Signal Matrix Module Rear-Panel Connectors**

### 3.9.10 1250-40B Module Specific Syntax

3.9.10.1 The 1250-40B supports the OPEN, CLOSE, RESET, and PDATAOUT commands.

3.9.10.2 The Module Specific Syntax for the 1260-40B 4 x 5 Signal Matrix module is as follows:

<slotnumber>.<rownumber><columnnumber>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<rownumber> is the matrix row to be connected to <columnnumber>, value 00 through 03.

<columnnumber> is the matrix column to be connected to <rownumber>, value 00 through 04.

The following relay control matrix gives the possible command codes used to implement row and column closures for the 1250-40B.

| | | Column number | | | | |
|---|---|---|---|---|---|---|
| | | 00 | 01 | 02 | 03 | 04 |
| Row Number | 00 | 0000 | 0001 | 0002 | 0003 | 0004 |
| | 01 | 0100 | 0101 | 0102 | 0103 | 0104 |
| | 02 | 0200 | 0201 | 0202 | 0203 | 0204 |
| | 03 | 0300 | 0301 | 0302 | 0303 | 0304 |
| | 04 | 0400 | 0401 | 0402 | 0403 | 0404 |

3.9.10.3 Two digits are required to describe <rownumber> and <columnnumber>. A leading zero is added to both <rownumber> and <columnnumber>.

Example: CLOSE 3.0204

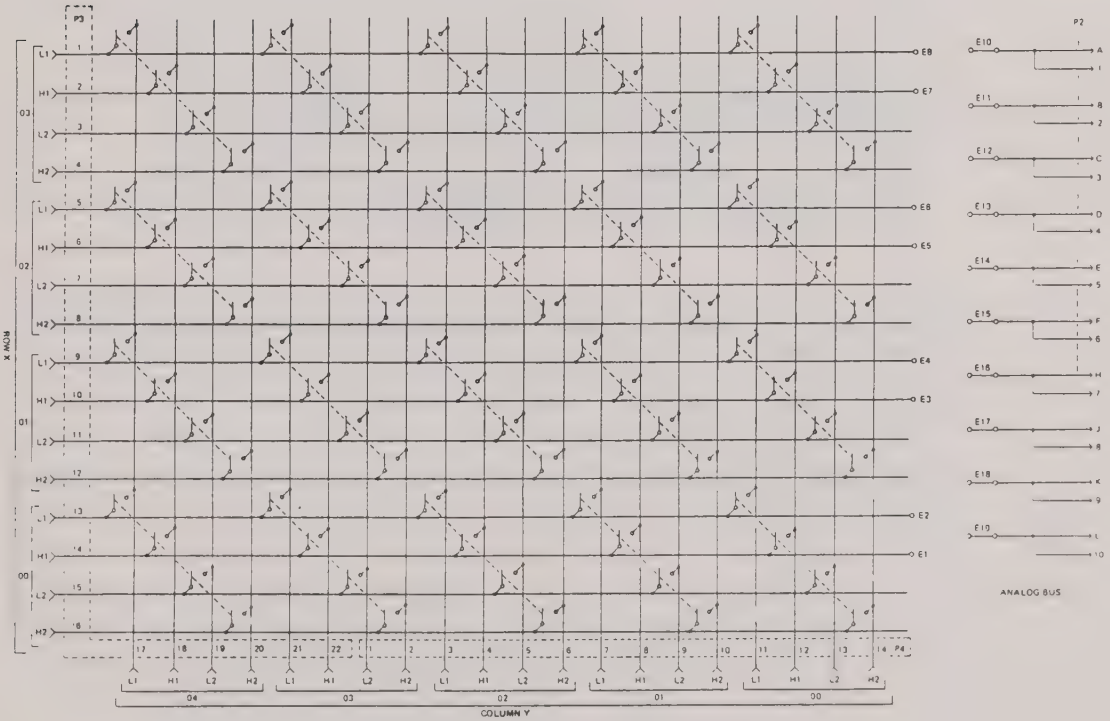
This CLOSE statement will connect row 2 to column 4 on the 1250-40B resident in 1250 slot 3.

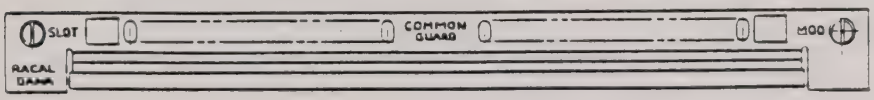
3.9.10.4 In the case that more than one connection is to be made or broken on the 1260-40B with contiguous rows or columns, then the following format is supported:

<rownumber><columnnumber>-<rownumber><columnnumber>

Example: OPEN 3.0101-0204

This OPEN statement has the same effect as a series of open commands to open all of the connections between rows from 1 through 3 and columns 1 through 4. i.e. connections 0101, 0102, 0103, 0104, 0200, 0201, 0202, 0203 and 0204 are opened.



### 3.9.11 1250-45 Module Specific Syntax

The 1250-45 supplies a two wire 4x12 signal switching matrix or it may be configured in the factory as two 4x6 matrices, for use at up to 10 MHz.

3.9.11.1 The 1250-45 supports the OPEN, CLOSE, RESET, and PDATAOUT commands.

3.9.11.2 The Module Specific Syntax for the 1260-45 4 x 12 Signal Matrix module is as follows:

<slotnumber>.<rownumber><columnnumber>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

<rownumber> is the matrix row to be connected to <columnnumber>, value 00 through 03.

<columnnumber> is the matrix column to be connected to <rownumber>, value 00 through 12

3.9.11.3 Two digits are required to describe <rownumber> and <columnnumber>. A leading zero is added to both <rownumber> and <columnnumber>.

Example: CLOSE 3.0204

This CLOSE statement will connect row 2 to column 4 on the 1250-45 resident in 1250 slot 3.

3.9.11.4 In the case that more than one connection is to be made or broken on the 1250-45 with contiguous rows or columns, then the following format is supported:

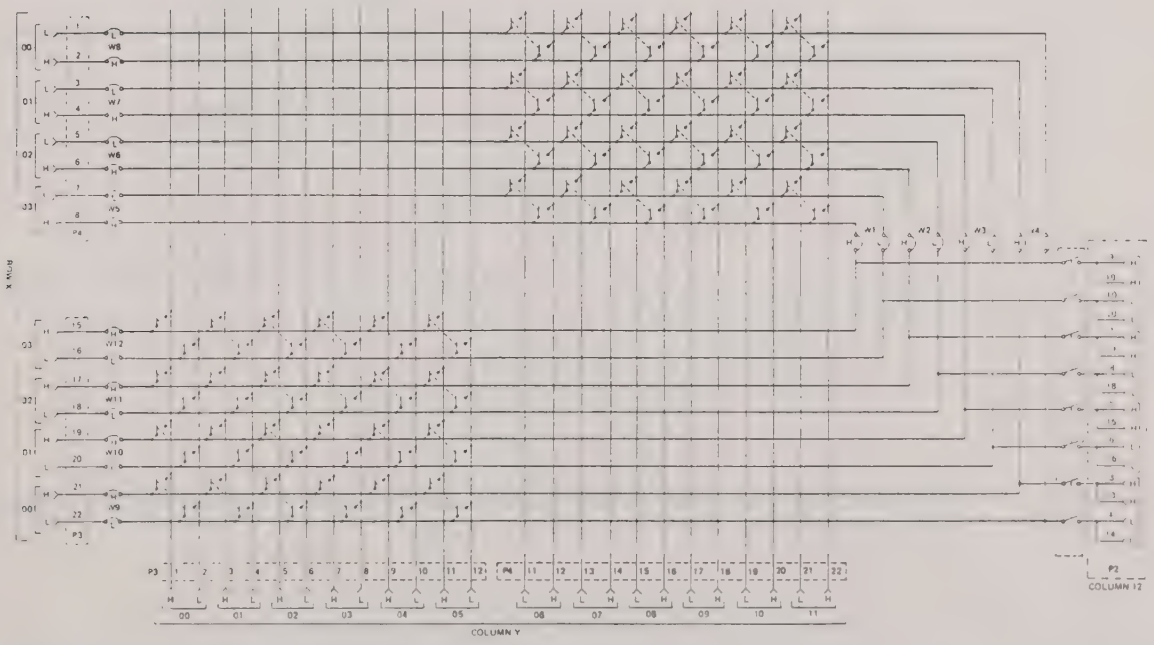
<rownumber><columnnumber>-<rownumber><columnnumber>

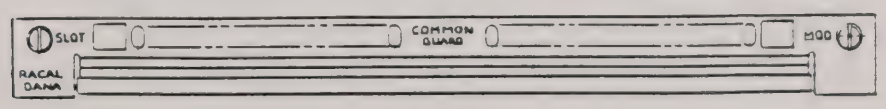
Example: OPEN 3.0101-0204

This OPEN statement has the same effect as a series of open commands to open all of the connections between rows from 1 through 3 and columns 1 through 4. i.e. connections 0101, 0102, 0103, 0104, 0200, 0201, 0202, 0203 and 0204 are opened.

**NOTE**

To close the relays that connect and disconnect the matrix rows to the analog bus, via column 12, OPEN and CLOSE commands are used. For example, if this card were installed in slot 1, CLOSE 1.0012 and OPEN 1.0012 will connect and disconnect the matrix rows to and from the analog bus.



### 3.9.12 1250-50, 1250-51A and 1250-51B, R.F. Multiplexer Module Specific Syntax

3.9.12.1 The 1250-50, 51A and 51B R.F. multiplexer modules support the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.12.2 The module specific syntax for the 1250-50, 1250-51A and 1250-51B, R.F. Switch modules is as follows:

3.9.12.3 OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>].....

where <channel> is the relay to be closed to connect an input or output to the Common line. Note that two connections at least are required to connect an input to an output. Channels remain closed until opened by an OPEN command. Care must be taken not to leave connections closed if not required, as this may lead to unwanted connections to instruments, etc.

The range of values for <channel> is:

1250-50 and 51B: 00 - 04, 10 - 14, 19, 20 - 24, 30 - 34 and 39

1250-51A: 00 - 04, 10 - 14 and 19

3.9.12.4 The Module Specific Syntax for the CLOSE command is the same as for the OPEN command.

3.9.12.5 The SETUP command controls the sequence mode of the 1250-50, 51A and 51B only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

3.9.12.6 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-50, 51A and 51B switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.12.7 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching module to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

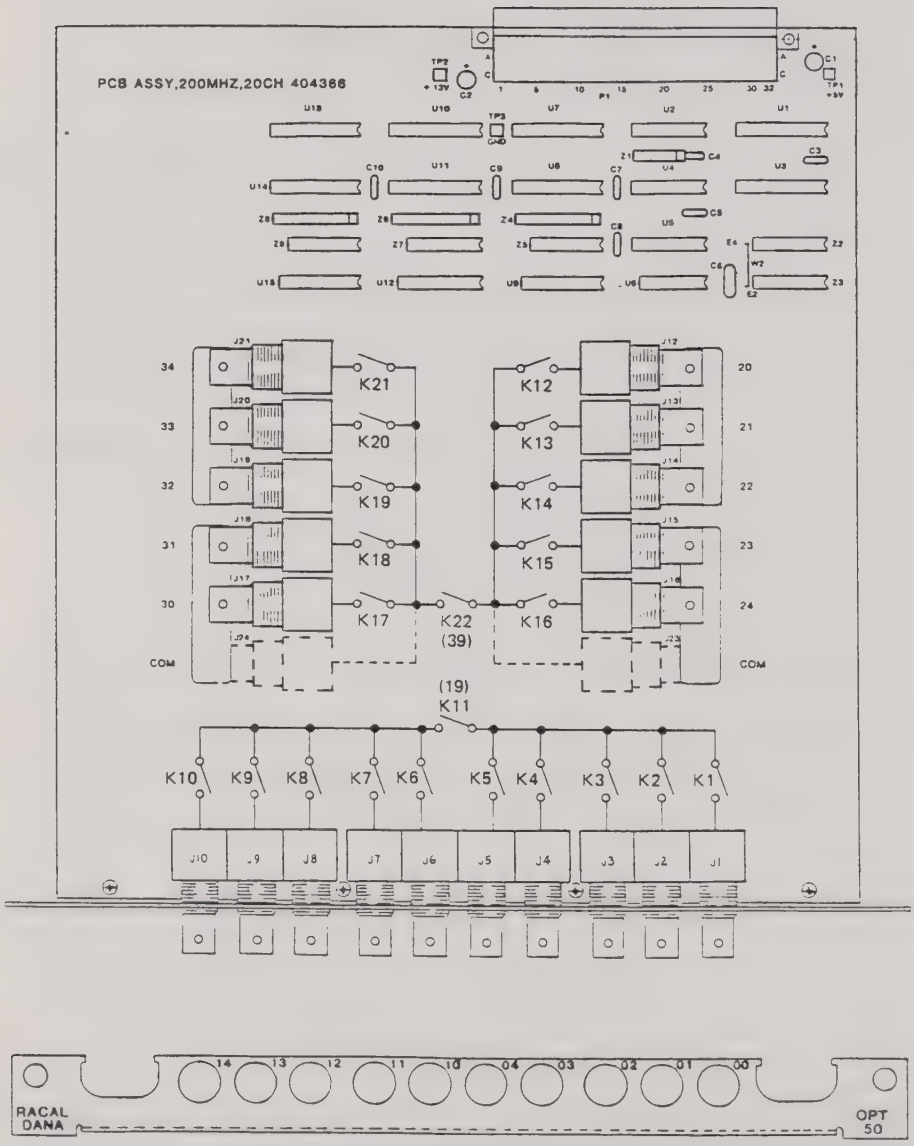
The responses to the PDATAOUT command for the 1250-50, 51A and 51B RF switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

The range of values for <channel> is:

1250-50 and 51B: 00 - 04, 10 - 14, 19, 20 - 24, 30 - 34 and 39

1250-51A: 00 - 04, 10 - 14 and 19







**1250-50 Module PCB Top View and Rear Panel Connectors Showing Channel Numbering and Connector Placement**

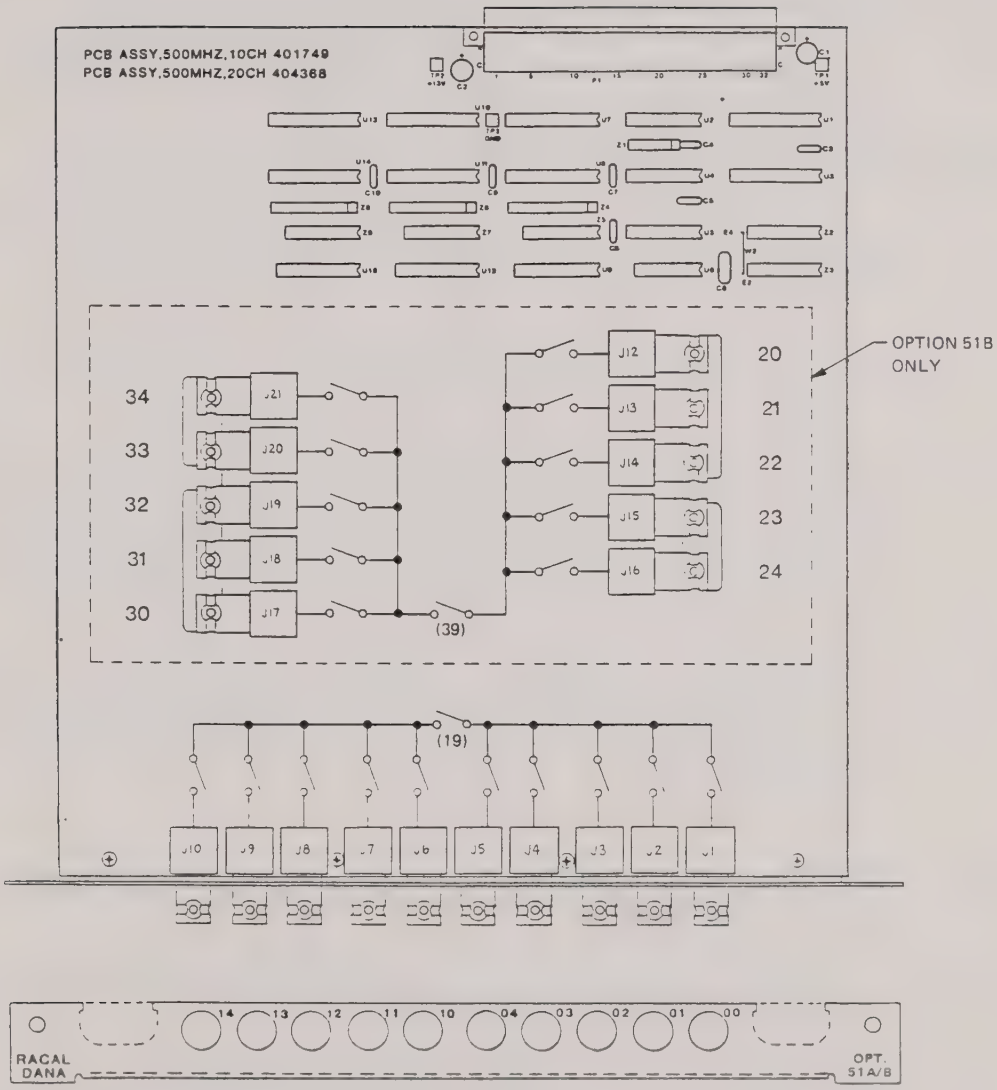



**Figure 2.14 – 1250-51A/B Module PCB Top View and Rear Panel Connectors Showing Channel Numbering and Connector Placement**

### 3.9.13 1250-52A and 1250-52B R.F. Multiplexer Module Specific Syntax

3.9.13.1 The 1250-52A and 1250-52B R.F.Switch modules support the OPEN, CLOSE, PSETUP, RESET and PDATAOUT commands.

3.9.13.2 The module specific syntax for the 1250-52A and 1250-52B R.F. Switch modules is as follows:

3.9.13.3 OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>].....

where <channel> is the relay to be closed to connect an input to an output.

The range of values for <channel> is:

1250-52A: 00 - 04 and 10 - 14

1250-52B: 00 - 04, 10 - 14, 20 - 24 and 30 - 34

3.9.13.4 The Module Specific Syntax for the CLOSE command is the same as for the OPEN command. Note that connections to 04, 14, 24 and 34 are connections to a "not connected" pin and any connections in a group are opened. The commands OPEN and CLOSE will both open an existing connection if directed to one of the "not connected" pins.

3.9.13.5 Connections between input and output are mutually exclusive within a group in the 1250-52 switch modules. A CLOSE command will open an existing connection and close the new connection and an OPEN command will open any existing connection in the group and open circuit the Common connection.

3.9.13.6 The 1250-52A and 1250-52B are restricted to the Break Before Make sequence mode only.

3.9.13.7 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-52A and 1250-52B modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>

<slotnumber>. BBM
<slotnumber>.END

3.9.13.8 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching module to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

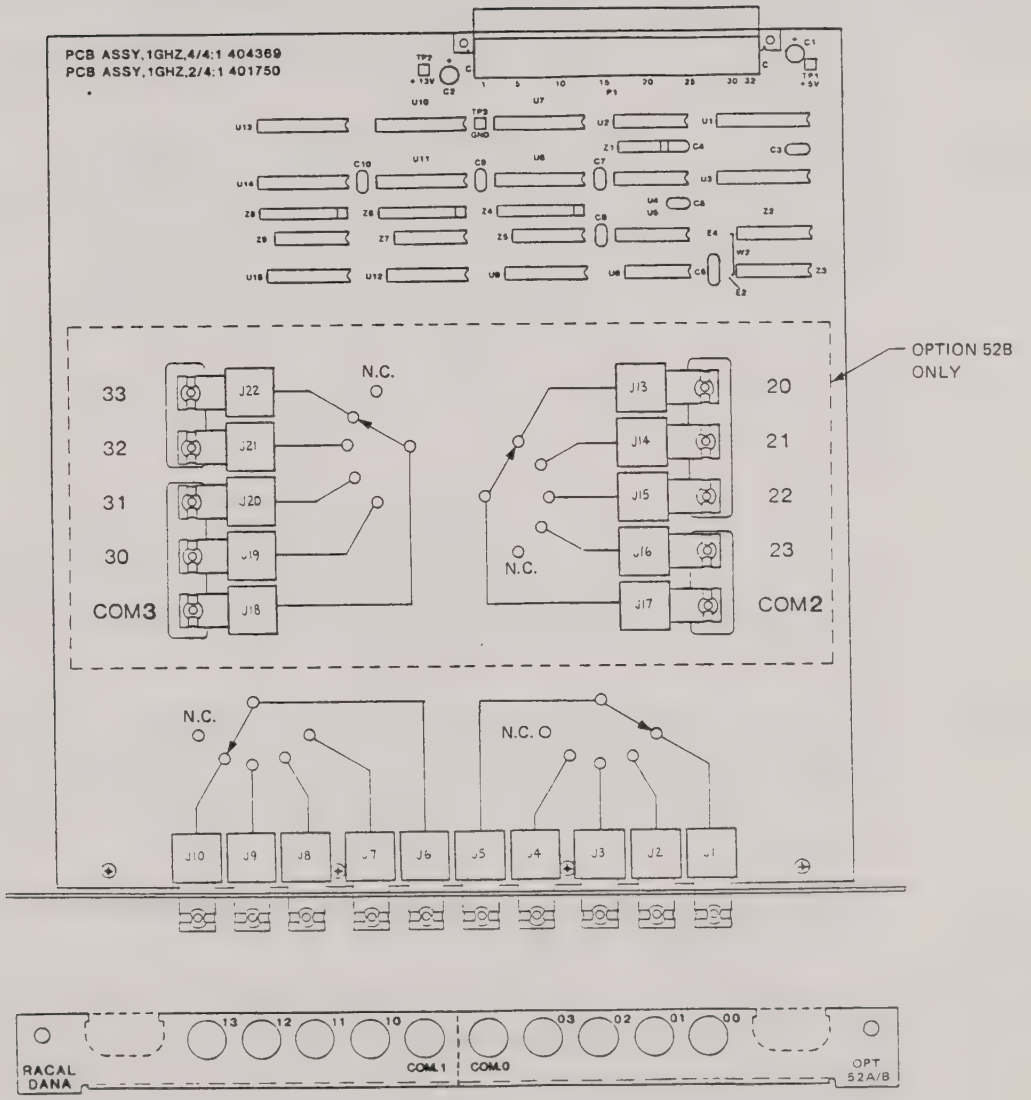
where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-52A and 52B RF switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

The range of values for <channel> is:

| | |
|---|---|
| 1250-52A: | 00 - 04 and 10 - 14 |
| 1250-52B: | 00 - 04, 10 - 14, 20 - 24 and 30 - 34 |




**1250-52A/B Module PCB Top View and Rear Panel Connectors Showing Channel Numbering and Connector Placement**

### 3.9.14 1250-54B and 1250-55B RF Multiplexer Module Specific Syntax

3.9.14.1 The 1250-54B and 1250-55B R.F. multiplexer support the OPEN, CLOSE, SETUP, PSETUP, RESET and PDATAOUT commands.

3.9.14.2 The module specific syntax for the 1250-54B and 1250-55B R.F. Multiplexers is as follows:

3.9.14.3 OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>].....

Where <channel> is the relay to be closed to connect an input to the output. Channels remain closed until opened by an OPEN command.

The range of values for <channel> is:

00 - 04
10 - 14
20 - 24
30 - 34

3.9.14.4 The Module Specific Syntax for the CLOSE command is the same as for the OPEN command. Note that connections to 04, 14, 24 and 34 are connections to a "not connected" pin and any connections in a group are opened. The commands OPEN and CLOSE will both open an existing connection if directed to one of the "not connected" pins.

3.9.14.5 Connections between input and output are mutually exclusive within a group in the 1250-54B and 1250-55B switch modules. A CLOSE command will open an existing connection and close the new connection and an OPEN command will open any existing connection in the group and open circuit the Common connection.

3.9.14.6 The 1250-54B and 1250-55B switching modules are restricted to the Break Before Make sequence mode.

3.9.14.7 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-54B multiplexer is as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.BBM
<slotnumber>.END

3.9.14.8 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the switching module to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PDATAOUT command for the 1250-50, 51A, 51B and 52A RF switch modules are as follows:

<slotnumber>.1250-NN <MODULE NAME>
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

The range of values for <channel> is:

00 - 03, 10 - 13, 20 - 23 and 30 - 33.

### 3.9.15 1250-60 and 1250-61 Microwave Switching Module Specific Syntax

3.9.15.1 The 1250-60 and 1250-61 support the OPEN, CLOSE, SETUP, PSETUP, PDATAOUT and RESET commands.

3.9.15.2 The module specific syntax for the 1250-60 and 1250-61 is of the form:

OPEN <slotnumber>.<channel>[;<slotnumber>.<channel>

where <slotnumber> is the 1250 chassis slot that the 1250-60 and 1250-61 switch modules reside in, value 1 - 5.

<channel> is the reference of a SPDT relay resident on the switching module. The range of values for <channel> is 0 - 1 for the 1250-60A and 1250-61A, and 0 - 3 for the 1250-60B and 1250-61B.

3.9.15.3 The module specific syntax used for the CLOSE command is the same as for the OPEN command.

3.9.15.4 The SETUP command controls the sequence mode of the 1250-60 and 1250-61 only. The syntax used is:

SETUP <slotnumber>.<seqmode>

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

and <seqmode> is BBM, (Break before make)
MBB, (Make before break)
IMM, (Immediate)

3.9.15.5 The PSETUP command causes the specified module setup to be transmitted to the 1250s controller. The syntax used is:

PSETUP <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

The responses to the PSETUP command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-60A/61A MICROWAVE MODULE
<slotnumber>.<seqmode>
<slotnumber>.END

3.9.15.6 The PDATAOUT command causes the specified module to transmit the CLOSED state of the relays fitted to the board to the 1250s controller. The syntax used is:

PDATAOUT <slotnumber>[;<slotnumber>][;<slotnumber>].....

where <slotnumber> is the 1250 chassis slot that the 1250 Series module resides in, value 1 - 5.

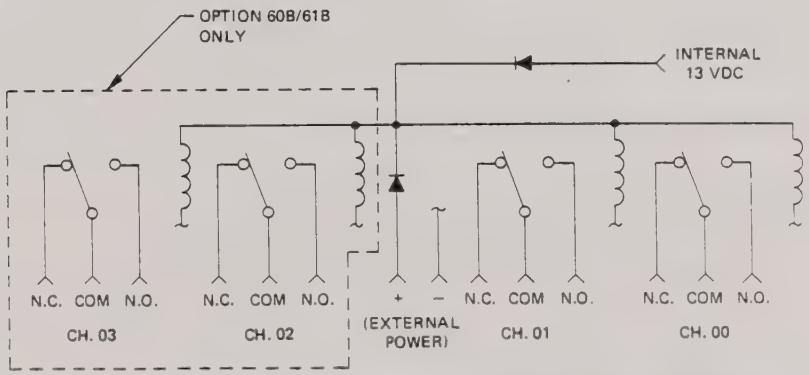
The responses to the PDATAOUT command for the 1250-60 and 1250-61 microwave switch modules are as follows:

<slotnumber>.1250-60A/61A MICROWAVE MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0 or 1 for the 1250-60A and 1250-61A.

<slotnumber>.1250-60B/61B MICROWAVE MODULE
<slotnumber>.<channel>[,<channel>][,<channel>].....
<slotnumber>.END

where <channel> is 0, 1, 2 or 3 for the 1250-60B and 1250-61B.




**1250-60A/B and 1250-61A/B Microwave Switching Module Simplified Connection Diagram**

**1250-60A/61A Rear Panel Connectors Showing Channel Numbering and Connector Placement**

**1250-60B/61B Rear Panel Connectors Showing Channel Numbering and Connector Placement**

## 3.10 Local Control

### 3.10.1 Introduction

3.10.1.1 Local control of the 1250 is only available through the use of the Intelligent front panel, Option 90. This option allows the operator to control all 1250 functions from the front panel using keystrokes similar in format to the GPIB commands used to control the 1250.

### 3.10.2 1250 Intelligent Front Panel (Option 90)

3.10.2.1 Refer to Figure 3-X for an illustration of the 1250 Intelligent Front Panel (Option 90) and to Table 3-X for descriptions of the features of the 1250 Intelligent Front Panel.

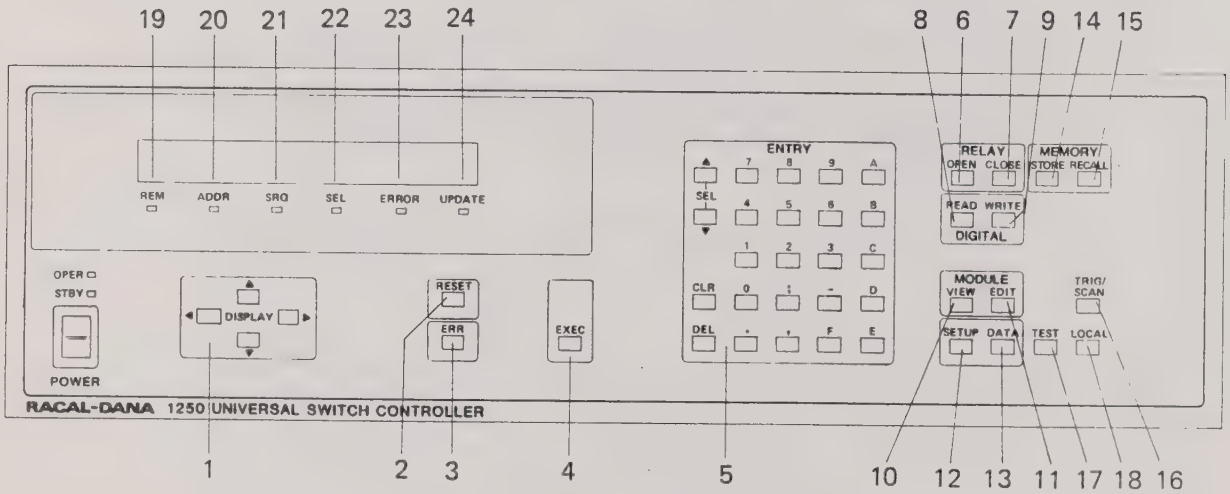



**Figure 3-X, 1250 Intelligent Front Panel**
**Table 3-X, 1250 Intelligent Front Panel Features**

| Reference | Description |
|---|---|
| 1 | Display keys. These four keys are used to scroll the 1250 display UP, DOWN, LEFT or RIGHT, when it is necessary to view more information than may be displayed at one time. The information to be viewed may be more than the 16 character LED display can show or may be contained in more than one line, requiring the use of these keys. The direction of scrolling that each key causes is as marked on the front panel with arrows. |
| 2 | RESET key. This key, when used with the EXEC key, causes the 1250 to return to its home state and to open all channel |

closures. All slot 0 settings are lost except the power up recall.

3 ERR (Error) key. This key causes any errors that have occurred to be displayed on the 1250 front panel display. The error message is of the form ERROR X.YY where X is the slot number associated with the error, value 0 - 5 (slot 0 is the mainframe) or XX if the error is not associated with a particular slot. YY is a two digit decimal number detailing the error. Refer to the YERR section in the Device Dependant Command Codes on page 3-17 for a listing of all error codes. The error is displayed while the ERR key is depressed and remains in the system until cleared by the CLR key or the 1250 is RESET.

4 EXEC (Execute) key. This key is used to cause the 1250 to carry out the commands associated with the different keys on the front panel after the keys selected are used.

5 Entry keys. These keys are used to enter data for use with the various command keys. The . and - keys are used to enter the delimiters required by the various command keys. The SEL keys are used to select between the various option available for the 1250 Series modules setups. The CLR key clears the current display, clears reported errors and returns the 1250 display to the power up condition. It also clears any commands entered since the last use of the EXEC key. The DEL key is used to delete the last data entry made, one character at a time, starting with the most recently entered.

6 OPEN key. This key is used to command the opening of previously closed 1250 Series switching module relays. Note that each switching module requires different descriptors for the command to be implemented.

7 CLOSE key. This key is used to command the closing of previously open 1250 Series switching module relays. Note that each switching module requires different descriptors for the command to be implemented.

8 READ key. This key is used to read digital data from the 1250 Series boards that support digital I/O operations.

9 WRITE key. This key is used to write digital data to the 1250 Series boards that support digital I/O operations.

10 VIEW key. This key is used to examine the operating conditions (setup or specific module data) used in the 1250 Series modules fitted to the 1250 and for the 1250 itself. Use with the SETUP and DATA keys and a numeric specifier that defines the slot to be viewed.

11 EDIT key. This key is used to change the operating conditions (setup or specific module data) used in the 1250 Series modules fitted to the 1250 and for the 1250 mainframe. Use with the SETUP key and a numeric specifier that defines the slot to be edited.

12 SETUP key. This key specifies the type of information to be viewed in the 1250. Use with the VIEW and EDIT keys.

13 DATA key. This key specifies the type of information to be viewed. Use with the VIEW key.

14 STORE key. This key is used to store switch settings for all relay modules fitted to the 1250 in non-volatile memory.

15 RECALL key. This key is used to recall switch settings for all switch modules fitted to the 1250 from non-volatile memory.

16 TRIG / SCAN key. This key causes the 1250 to execute the next switch closure described in the scan list and open the previous switch closure if the scan mode is active.

17 TEST key. This key allows the operator to carry out the five 1250 self tests. Used with the entry keys.

18 LOCAL key. This key returns the 1250 to the GPIB local mode if it is in the remote mode. The 1250 will also display the power on SRQ status of the 1250 and the GPIB address.

19 REM LED. This LED lights to show that the 1250 is in the GPIB remote mode.

20 ADDR LED. This LED lights to show that the 1250 is addressed over the GPIB.

21 SRQ LED. This LED lights to show that the 1250 has asserted the GPIB SRQ line.

22 SEL LED. This LED lights to show that the SEL keys should be used.

23 ERROR LED. This LED lights to show that an error has occurred and that the ERR key should be used to determine the error reported. The LED remains lit until the CLR or RESET key is used.

24 UPDATE LED. This LED lights when one of the front panel keys is pressed or when commands are issued over the GPIB.

### 3.10.3 Local Operation

#### 3.10.3.1 Introduction

3.10.3.1.1 This section provides the information necessary to operate the 1250 using Option 90, the Intelligent front panel. As each 1250 Series switching module has a different configuration, different keystrokes are required to control the different modules. The keystrokes required are given in the section on Module Specific Syntax and are the same as the syntax used in the command codes used for remote control of the switch modules.

3.10.3.1.2 A close correspondence between the command codes used in the remote control of the 1250 and the keystrokes used to control it locally exists. It is recommended that the user be familiar with these command codes before operating the 1250 locally.

3.10.3.1.3 In general, each command is entered by pressing the front panel key that defines the type of operation to be performed, entering the data that defines the specific actions to be carried out and then carrying out the command by pressing the EXEC key. No action is taken by the 1250 until the EXEC key is pressed.

#### 3.10.3.2 OPEN and CLOSE keys

3.10.3.2.1 The two main keys used to control the 1250 Series switch modules are the OPEN and CLOSE keys. Pressing either key causes the command to appear in the 1250 display. The 1250 then waits for the relay paths to be opened or closed to be specified. The details of the path to be opened or closed are entered from the front panel entry keys. The various paths that each 1250 Series switching module can implement are detailed in the section on Module Specific Syntax.

3.10.3.2.2 More than one path opening or closure may be carried out by concatenating the module specific commands with the semi-colon key. The two operations cannot be mixed.

3.10.3.2.3 All paths must be individually opened or closed. Existing path openings or closures are not affected by subsequent commands.

**Example 1:** To close a connection between row 02 and column 03 and row 04 and column 05 on a 1250-40 Matrix module in chassis slot 2 and close path 3 on a 1250-60B Microwave Switching module in chassis slot 4 with one command, enter the following keystrokes.

CLOSE 2 . 0 2 0 3 ; 2 . 0 3 0 4 ; 4 . 3 EXEC

**Example 2:** To open channel 8 on a 1250-12 Relay Actuator module in chassis slot 3, enter the following keystrokes:

OPEN 3 . 8

### 3.10.3.3 READ and WRITE keys

3.10.3.3.1 The READ and WRITE keys are used to transfer digital data to and from the 1250-10 and 1250-14 modules. The data is entered in binary weighted decimal form from the front panel entry keys.

3.10.3.3.2 To write digital data out to a module, the WRITE key is used, along with the data entry keys. The module specific syntax required is <slotnumber>.<portnumber>,<data> as described in the section on Device Dependant Command Codes.

3.10.3.3.3 To READ data back from a port, the READ key is used, along with the data entry keys. The module specific syntax required is <slotnumber>.<portnumber> as described in the section on Device Dependant Command Codes.

**NOTE**

The format of the data returned from a Digital I/O Module varies according to the I/O port read. Ports 1 and 2 return the data in a binary weighted decimal form and port 2 returns the data in 2s complement form.

3.10.3.3.4 More than one READ or WRITE command may be entered at a time by concatenating the module specific syntaxes together with semi-colons (;).

3.10.3.3.5 The results of a READ operation are obtained by the use of the VIEW and DATA keys. If the 1250 is in the VIEW DATA mode for the slot containing the Digital I/O module, the slot number, port selected and data obtained from the READ operation is displayed on the 1250 front panel automatically.

3.10.3.3.6 The VIEW DATA mode displays the slotnumber, port and data transferred in the last digital I/O operation, regardless of whether it was a READ or a WRITE operation.

**Example 1:** To write 55 out to a 1250-14 Digital I/O module port 1 in chassis slot 1 and 170 to port 1 of a Digital I/O Module in chassis slot 3, enter the following keystrokes:

WRITE 1 . 1 , 5 5 ; 3 . 1 , 1 7 0 EXEC

**Example 2:** To read the data at port 2 of a 1250-14 Digital I/O module in chassis slot 5, enter the following key strokes:

READ 5 . 2 EXEC

To examine the data obtained from the READ operation, press:

VIEW DATA 5 EXEC

3.10.3.3.7 To change the Digital I/O module mode and polarity codes, enter the key sequence:

EDIT SETUP <slotnumber> EXEC <modenumber> , <polaritycode>

The 1250 will insert a decimal point after the <slotnumber> after the EXEC key is pressed as a prompt to enter the mode and polarity code numbers. Both mode and polarity codes must be entered, even if one of the default settings is resident and is not to be changed. The mode and polarity codes are as described in the section on Device Dependant Command Codes.

### 3.10.3.4 STORE and RECALL keys

3.10.3.4.1 The STORE and RECALL keys are used to store 1250 switching module configurations in the non-volatile memory provided and recall those settings as required. The configurations of all switch modules resident in the chassis are stored and the same module types must be resident in the same chassis slots when the configuration is recalled. If the module configuration recalled is not the same as the configuration that was stored, an error will be generated.

3.10.3.4.2 To store a 1250 chassis switching module configuration, enter the key sequence:

STORE <non-vol location> EXEC
where <non-vol location> is in the range 1 - 47.

NOTE

1250s with operating system software at level 13.1 or below have 63 non-vol locations.

3.10.3.4.3 To recall a 1250 configuration, enter the key sequence:

RECALL <non-vol location> EXEC

where <non-vol location> is the same as for the STORE key.

3.10.3.4.4 If the 1250 power up recall (PUPRCL) feature is active, the 1250 will automatically set the 1250 to the configuration stored in non-vol location 1 at power up. The legend PUPRCL . . . will be displayed after the power up self test is completed to indicate that this is occurring.

**3.10.3.5 TEST key**

3.10.3.5.1 The TEST key is used to carry out the 1250 self tests available. Two additional tests for the intelligent front panel are available in addition to the tests that are available over the GPIB. The tests available are:

1 - Non-destructive RAM test

2 - EPROM checksum test

3 - Non-destructive non-volatile memory test

4 - Display Test. All possible characters are displayed in turn in all display segments for approximately 1 second. The test is repeated until the test mode is exited by the use of the TEST key.

5 - Keyboard test. Each key pressed during this test does not carry out its usual function but displays the key function on the 1250 display, with the exception of the TEST key. This key is used to exit the test.

3.10.3.5.2 To carry out one of the 1250 self tests, enter the key sequence:

TEST 0 . <testnumber>

where <testnumber> is in the range 1 - 5 and is as described above.

3.10.3.5.3 Successful completion of tests 1 - 3 is indicated by the 1250 returning to the condition it was in prior to the test being carried out. Exiting tests 4 and 5 will also return the 1250 to the condition it was in. A test failure will be indicated by the ERR LED lighting.

### 3.10.3.6 LOCAL key

3.10.3.6.1 The LOCAL key is used to remove the 1250 from the GPIB REMOTE state and place it in the LOCAL state. While pressed, the 1250 will display its GPIB address and whether the power up recall feature is active or not.

### 3.10.3.7 TRIG / SCAN key

3.10.3.7.1 The TRIG / SCAN key is used to sequence the 1250 through the switch closures described in the scan list. Each time the key is pressed, the 1250 will open the previously specified switch closures and closes the next set of relays specified.

3.10.3.7.2 Refer to the section on the scan list for the details of the 1250 response to the various elements of the scanlist.

3.10.3.7.3 A break point in the scan list will cause the 1250 to stop scanning after opening the previous channel. A break point in the scan list is defined as the character zero delimited by semi-colons (;0;). On reaching a scanlist break point, the scan mode is set to SCAN OFF. Scanning is resumed after editing the slot 0 SETUP to SCAN ON or SCAN CONT. SCAN CONT will cause the 1250 to resume scanning from the scan list break point it was paused at and the SCAN ON command will cause the 1250 to resume scanning from the beginning of the scan list.

### 3.10.3.8 VIEW key

3.10.3.8.1 The VIEW key is used with either the SETUP or DATA key to display information about the modules installed in the 1250 chassis. VIEW SETUP will display the slot number and information about the setup of the module specified in a multiline format. VIEW DATA will display the slot number and module type and the configuration for the slot specified in a multiline format. The DISPLAY up, down, left and right keys are used to scroll through the information displayed.

3.10.3.8.2 To view the setup of a slot, enter the key sequence:

VIEW SETUP <slotnumber> EXEC

and use the display keys to scroll through the lines of information presented.

3.10.3.8.3 The SETUP for slot 0 is as follows:

0.MODEL 1250 UNIVERSAL SWITCH CONTROLLER
0.CNF OFF or ON
0.DLY <value>
0.DSP ON or OFF
0.EQU <list>
0.EXCL <list>
0.SCAN ON, OFF or CONT
0.SLIST <list>
0.SRQMASK <VALUE>
0.TRIG ON or OFF
0.PUPRCL ON or OFF

The setup for switch modules is a two line message consisting of a module identifying header and the relay actuation sequence, (MBB, BBM or IMM). Each line is preceded by the slotnumber that the module is resident in.

The setup for the 1250-14 Digital I/O module is a two line message consisting of a module identifying header and the port number and data transferred in the last digital I/O operation. Each line is preceded by the slotnumber that the module is resident in.

3.10.3.8.4 To view the data available for a slot, enter the key sequence:

VIEW DATA <slotnumber> EXEC

The data for slot 0 is a two line statement consisting of an identifying header and the 1250 operating system rev. level. Each line is preceded by the slotnumber that the module is resident in. The data for switch modules in slots 1 - 5 is a two line statement consisting of an identifying header and the channels closed on the module in the slot specified. The data for the 1250-14 Digital I/O module is a two line statement consisting of an identifying header and the slotnumber, portnumber and digital data transferred in the last I/O operation.

3.10.3.8.5 The SETUP or DATA for more than one slot may be obtained by hyphenating the first and last slot numbers of interest. In this case, several continuous lines of information will be available and the slot information is distinguished by the relevant slotnumber being the first element of each line.

3.10.3.8.6 The 1250 will remain in the VIEW DATA mode until the 1250 is RESET or the CLR key is used. The 1250 display will temporarily display new instructions until the EXEC key is pressed and then return to the VIEW DATA mode. GPIB activity will not cause the 1250 to exit this mode unless it is a RESET command.

### 3.10.3.9 EDIT key

3.10.3.9.1 The edit key is used with the SETUP key to change the operating parameters of the 1250. All parameters that can be examined with the VIEW SETUP key sequence may be changed with the EDIT key.

3.10.3.9.2 To edit a slot setup, enter the key sequence

EDIT SETUP <slotnumber> EXEC

and then use the DISPLAY keys to display the parameter to be changed. Enter data or use the SEL keys to display the desired parameter. Press the EXEC key to make the new parameter active.

3.10.3.9.3 For slot 0, the parameters to be edited are presented in the same order as they are given for the VIEW SETUP command. The operating condition is blank until the operator enters information via the SEL keys or the ENTRY keypad. Operating parameters requiring the use of the SEL keys are indicated by the SEL LED lighting. The parameters requiring data entry via the ENTRY keypad are the Equate, Exclude and Scan lists. The format for this data is as described in the section on Device Dependant Command Codes. Only one operating parameter may be edited at a time. The operating parameter displayed on the front panel is entered into the 1250 memory by the use of the EXEC key.

3.10.3.9.4 For switch modules in slots 1 - 5, the only operating parameter that can be edited is the relay actuation mode. The three options are Make Before Break (MBB), Break Before Make (BBM) and Immediate (IMM). The SEL LED lights to show that the SEL keys are to be used to scroll through the options for the sequence mode. The sequence mode selected is the one displayed when the EXEC key is pressed.

3.10.3.9.5 For the 1250-14 Digital I/O module, the mode number and polarity code may be edited. These parameters are as described in the Device Dependant Command Code section. Note that both of these parameters must be entered from the ENTRY keypad, even if one of them is not to be changed.

**Example 1:** To change the relay actuation mode of a 1250-51B 500 MHz RF switching module in chassis slot 4, enter the following key sequence:

EDIT SETUP 3 EXEC

Scroll through the possible actuation modes until the required mode is displayed. Press EXEC to make the new sequence mode active.

**Example 2:** To turn the power up recall feature off, enter the key sequence:

EDIT SETUP 0 EXEC

Scroll down the slot 0 operating parameters with the DISPLAY keys until the 1250 displays 'PUPRCL _'. Use the SEL keys to change the display to PUPRCL OFF and press EXEC to deactivate the power up recall feature.

### 3.10.3.10 DEL key

3.10.3.10.1 The DEL key is used to remove data from the 1250 display in the EDIT mode before it is entered into the 1250 memory. Each time the key is pressed, the last character in the display will be removed, until the cursor reaches the operating parameter legend displayed. Further use of the DEL key will have no effect.

### 3.10.3.11 CLR key

3.10.3.11.1 The CLR key clears the 1250 display and causes the 1250 to display the message "RACAL DANA 1250". All action taken since the last use of the EXEC key is cleared.

### 3.10.3.12 EXEC key

3.10.3.12.1 The EXEC key is used to execute all commands entered from the 1250 front panel. After its use, the 1250 becomes quiescent until another command is entered and executed.

### 3.10.3.13 RESET key

3.10.3.13.1 The RESET key is used with the EXEC key to return the 1250 to its power up (Home) state and to open all relay closures. To reset the 1250, enter the key sequence:

RESET EXEC

3.10.3.13.2 Note that the RESET key will not affect the status of the Power up recall (PUPRCL) feature.

### 3.10.3.14 ERR key

3.10.3.14.1 The ERR key is used to display the error number associated with a 1250 failure. The ERR LED lights to show that an error has occurred and that an error code is available. The 1250 will display "ERROR <slotnumber>.<error code> while the ERR key is pressed, where <slotnumber> is the slot that generated the error and <error code> is the two digit error code that details the error. Refer to the table of error codes given in the YERR section of the

Device Dependant Command Codes section for the details of the possible errors. Note that if the error is not specific to one module, the 1250 will display the letter X and then the error code.

3.10.3.14.2 The ERR LED remains lit until the error is cleared with the CLR key or the 1250 is reset. Displaying the error will not clear the error from the 1250.

### 3.10.3.15 DISPLAY keys

3.10.3.15.1 The DISPLAY keys are used to scroll back and forth through displayed information if that information is made up of more characters than can be displayed on the 1250 front panel at one time or multiline information.

3.10.3.15.2 The DISPLAY left and DISPLAY right keys are used to scroll along a line of information if that line is too long to be completely displayed. Each time one of these keys is pressed, the display is shifted left or right by one character, according to which key is pressed. If the key is held down, the display will scroll as far as it can and then stop.

3.10.3.15.3 The DISPLAY up and DISPLAY down keys are used to scroll up and down through the lines of available information. Each time one of these keys is pressed, a new line is displayed from the beginning, regardless of the section of the previous line displayed. The new line displayed is from above or below the previous line, depending on the key pressed. Repeatedly pressing the same key will scroll the display to the one end of the multiline display and then stop. The display does not wrap around and begin to repeat any additional lines of information available.

### 3.10.3.16 SEL keys

3.10.3.16.1 The SEL keys are used to choose between the various options available in the EDIT mode. If a choice is to be made, then the SEL LED will light and a prompt will appear in the 1250 display. Use of the SEL up and SEL down will display the options available and the EXEC key will select the option displayed.

3.10.3.16.2 The SEL keys do not display the options available in a wraparound manner. Once the end of a list of options is reached, the other SEL key must be used to scroll through the options until the other end of the list is reached.

# SECTION 4 OPERATION VERIFICATION

## 4.1 INTRODUCTION

**4.1.1** By correctly completing the following Performance Verification Procedures (PVPs), functional operation of the 1250 mainframe, its plug-in modules, and the Option 90 Intelligent Front Panel is verified.

**4.1.2** The primary purpose of these tests is to provide a relatively fast and easy method for determining the operability of the 1250 and its various plug-in modules and Intelligent Front Panel.

## 4.2 GENERAL INFORMATION

**4.2.1** These PVPs should be performed whenever it is necessary to determine whether the 1250 and its plug-in modules/Intelligent Front Panel are operating correctly. These tests may also be used as an incoming inspection procedure to verify a suspected failure after the 1250 has been installed into a system. In addition, after diagnosing and repairing a 1250 failure, these PVPs can be used to confirm a satisfactory repair.

**4.2.2** A "test fixture" is needed for several performance tests and is noted in each appropriate subsection. The fixture simplifies testing and acts as an interface between the module and test multimeter. The test fixture can be fashioned for each module, using a removable wiring block configured as described in the corresponding subsection of the manual for each module.

## 4.3 REQUIRED EQUIPMENT

**4.3.1** The following test equipment is recommended for these PVPs. Equivalent test equipment may be substituted when desired.

a. Digital Multimeter - Racal-Dana Model 5004 or equivalent

b. GPIB Instrument Controller - Hewlett-Packard Series 200

## 4.4 PERFORMANCE VERIFICATION PROCEDURES

**4.4.1** The PVPs described in this section are divided into the following 9 subsections:

a. Mainframe Self-Test

b. GPIB Test

c. 1250-10 Breadboard Module Test

d. 1250-14 Digital Input/Output Module Test

e. 1250-40 Signal Matrix Module Test

f. 1250-60/1250-61 18/26.5 GHz Microwave Switching Module Tests

g. Low Frequency Relay Module Tests for the 1250-12, 1250-15, 1250-20, and 1250-30

h. RF Relay Module Tests for the 1250-50, 1250-51A/B, and 1250-52A/B

i. 1250-90 Intelligent Front Panel Option Test

**NOTE:**

Always perform the mainframe self-test and GPIB test before any of the remaining module tests. This will help ensure the most comprehensive approach toward isolating an actual problem or failure.

### 4.4.2 Mainframe Self-Test

4.4.2.1 The mainframe self-test verifies the operation of the display circuitry and most of the microprocessor-related circuitry on the computer board. This test, however, does not verify the operation of the backplane or associated drivers of the 1250 mainframe. The operation of the backplane and drivers is verified when the specific modules are tested.

**NOTE:**

If the mainframe self-test passes, this does not ensure that the 1250 is completely operational. Verification of proper operation is confirmed as the result of completing the specific module tests.

#### 4.4.2.2 Test Procedure

4.4.2.2.1 Initiate the mainframe self-test as follows:

a. Power down the 1250

b. Power up the 1250

c. The 1250 mainframe will have successfully passed a power-up self-test if after power-up the REM and ADDR LEDs are not illuminated. A failure is indicated as follows:

1. ADDR LED illuminated - ROM/RAM failure

2. REM LED illuminated - Microprocessor support circuitry/Non-Vol memory failure

3. ADDR and REM LEDs both illuminated - Self-configuration failure

d. If the Option 90 Intelligent Front Panel is installed, and the unit passes the power-up self-test, the following messages are displayed:

SELFTEST OK

RACAL-DANA 1250

- If the self-test fails, refer to Table 3.7 for an explanation of error codes

### 4.4.3 GPIB Test

4.4.3.1 See Table 4.1 below which provides a test program for conducting the 1250 GPIB operational verification test.

## Table 4.1 – 1250 GPIB Test Program

THE FOLLOWING IS A LISTING FOR THE 1250 GPIB OPERATIONAL TEST. THE PROGRAM IS WRITTEN IN HP BASIC 2.0 AND CAN BE RUN ON ANY HP SERIES 200 CONTROLLER. CONNECT THE CONTROLLER TO THE 1250 IEEE-488 CONNECTOR AND LOAD AND RUN THE FOLLOWING PROGRAM:

```
10    !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
20    !------------------- 1250 GPIB BUS TESTS  MDB: 4/25/86 -------------------
30    !  UPON EXECUTION. THIS PROGRAM WILL TEST THE FOLLOWING ASPECTS OF THE
40    !  1250 GPIB INTERFACE:
50    !     1) HANDSHAKE
60    !     2) BUS INITIATED SELF TEST
70    !     3) STATUS REPORTING WHEN POLLED.
80    !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
90    DIM Error$(2)[15]
100   ASSIGN @Out TO 710
110   ASSIGN @Crt TO 2
120    ON TIMEOUT 7,2 GOTO Timeerr
130         ENABLE INTR 7;2
140   REM 7
150   Clear$="K"
160   !
161!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
170 Test:   ! THIS ROUTINE CALLS A BUS INITIATED SELF TEST AND VERIFIES THAT                THE UNIT DOES NOT FAIL
180         OUTPUT @Crt:Clear$;
190         ON INTR 7 GOTO Srq
200         OUTPUT @Out:"RESET"
210         FOR Loop=1 TO 2
220         OUTPUT @Out:"TEST 0,"&VAL$(Loop)
230         GOSUB Spoll
240         OUTPUT @Out:"YERR"
250         GOSUB Spoll
260         ENTER @Out:Error$(Loop)
270           IF Error$(Loop)[10,10]<>"0" THEN
280             IF Loop=1 THEN PRINT "UUT FAILS RAM TEST. ERROR MESSAGE IS: ";
290               IF Loop=2 THEN PRINT "UUT FAILS ROM TEST. ERROR MESSAGE IS: ";
300            PRINT Error$(Loop)
310            GOTO 370
320           ELSE
330              IF Loop=1 THEN PRINT TABXY(1,3),"UUT PASSES RAM TEST"
340                IF Loop=2 THEN PRINT TABXY(1,5),"UUT PASSES ROM TEST"
350           END IF
360         PRINT
370         NEXT Loop
380         PRINT TABXY(1,7),"UUT PASSES GPIB TEST "
390         GOTO 650
391!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
400 Timeerr: ! FAILURE IF BUS TRANSACTIONS REQUIRE > 2 SECONDS
410                 PRINT "UUT FAILURE. TIMEOUT ERROR OCCURED"
420                    GOTO 650
430                 !
431!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
440 Srq:  ! UNEXPECTED SRQ OCCURED
450                 Status=SPOLL(@Out)
460                 PRINT "UUT FAILURE. A SRQ WAS ENCOUNTERED. THE VALUE OF THE STATUS BYTE IS ",Status
470                 GOTO 650
471!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
480 Spoll:! SERIAL POLL UUT UNTIL TEST IS COMPLETE. FAILURE IF TEST IS NOT                COMPLETED WITHIN 2 SECONDS.
481!
490                 PRINT TABXY(20,1),"WAITING FOR BUS SELF TEST TO COMPLETE"
500                 Elapsed=TIMEDATE
510                 Status=SPOLL(@Out)
520                   IF Status<>16 THEN
540                     IF TIMEDATE-Elapsed>2 THEN
550                       OUTPUT @Crt:Clear$;
560                       PRINT "FAILURE. UUT NEVER COMPLETED BUS SELF TEST"
570                       GOTO 650
580                     ELSE
590                       GOTO 510
600                     END IF
610                   END IF
620                 PRINT TABXY(20,1),"
630                 RETURN
640                 !
641!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
650                 END
```

### 4.4.4 1250-10 Breadboard Module Test

4.4.4.1 The 1250-10 Breadboard module permits the user to create circuits that will interact with the 1250. This module has three 8-bit output ports and three corresponding 8-bit input ports. Also, this module provides +5 VDC and +13 VDC (both at 1.7A) power supplies both of which are fused at 2A and have LED indicators. The module test consists of connecting each port output to its corresponding input and verifying that the port output data is valid by reading back the data written on each output port.

**WARNING**

If the 1250 switch controller is currently installed in a system, the 1250 must be disconnected from the system observing the following precautions. Completing this disconnection presents two potential safety hazards to the individual:

a. If high voltage exists in the system, the user may come in contact with it

b. Damage to equipment may occur if the wrong electrical lines are accidentally connected or disconnected

Therefore, the user must take the necessary precautions to prevent either a or b from occurring **before** disconnecting the wiring or the wiring block. This **WARNING** applies to all following test procedures.

#### 4.4.4.2 Test Procedure

**NOTE:**

Disconnect any user circuit from the three input or output ports that could cause a false failure.

1. Remove any wiring block from the 1250-10's rear edge connector
2. Enter the test program listed in Table 4.2 into the controller
3. Connect the GPIB cable of the controller to the 1250
4. Verify that LEDs CR1 and CR2 are illuminated
5. Execute the test program and follow the displayed prompts

**Table 4.2 - 1250-10 Breadboard Module Test Program**

```
10 !  1250-10 PERFORMANCE VERIFICATION TEST PROGRAM - 6/10/86 - MOOR
20    PRINT "CONNECT DATA IN TO DATA OUT ON ALL PORTS"
30    PAUSE
40    OUTPUT 2;"K";
50    INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
60    OUTPUT 2;"K";
70    FOR X=0 TO 2
80    FOR Y=0 TO 7
90    OUTPUT 710;"WR "&VAL$(S)&"."&VAL$(X)&","&VAL$(2^Y)
100   OUTPUT 710;"READ "&VAL$(S)&"."&VAL$(X)
110   ENTER 710;A
120   IF BINEOR(A,255-2^Y)=0 THEN GOTO 150
130   PRINT "PORT "&VAL$(X)&", D"&VAL$(Y)&"  DATA: ";A;"  SHOULD EQUAL ";255-2^Y;"  FAILED"
140   GOTO 160
150   PRINT "PORT "&VAL$(X)&", D"&VAL$(Y)&"  PASSED"
160   OUTPUT 710;"WRITE "&VAL$(S)&"."&VAL$(X)&",0"
170   NEXT Y
180   NEXT X
190   PRINT "TEST COMPLETE"
200   END
```

### 4.4.5 1250-14 Digital Input/Output Module Test

4.4.5.1 The 1250-14 Digital Input/Output module consists of 16 bidirectional data lines and 3 control lines. The test fixture is shown in Figure 4.1 and the test procedure for this module includes the following:

a. Data line input/output test

b. I/O and PCTL line test

c. PFLG line test

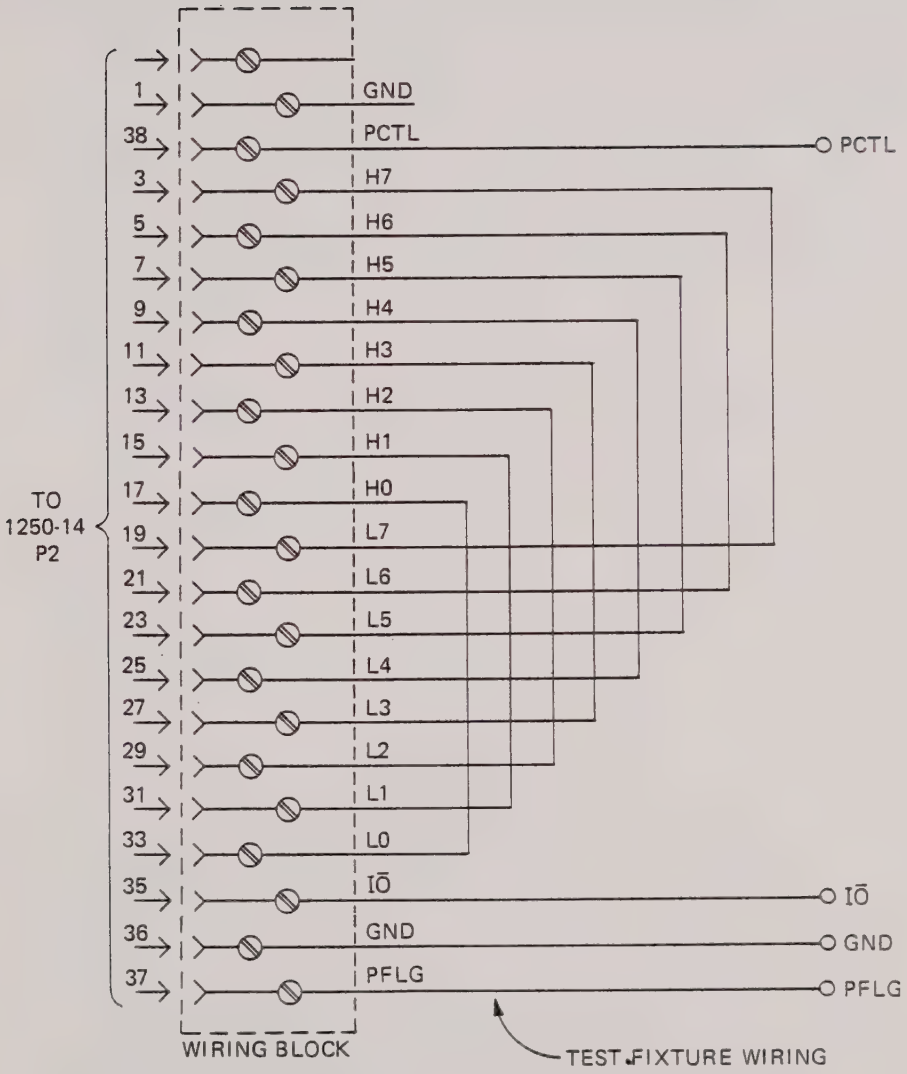



**Figure 4.1 - 1250-14 Test Configuration**

4.4.5.2 The first test uses the test fixture to connect the eight Lo Byte data lines to the eight Hi Byte data lines. Therefore, by writing to one set of data lines and reading the data from the other set, the operation of the data lines and the continuity of the fuses and connectors can be verified. The second test checks the operation of the I/O and PCTL lines by individually connecting each line to a DC voltmeter, using the controller to change the logic states of each line, and verifying the state change using the DC voltmeter. The third test verifies the proper operation of the PFLG line as a function of the level presented to its input.

4.4.5.3 **Test Procedure**

1. Install the test fixture onto the 1250-14's rear edge connector
2. Enter the test program listed in Table 4.3 into the controller
3. Execute the test program and follow the displayed prompts

## Table 4.3 – 1250-14 Digital Input/Output Module Test Program

```
10 ! 1250-14 PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20   PRINT "1. SET 1250 ADDRESS TO 10."
30   PRINT "2. CONNECT TEST FIXTURE TO THE 1250-14."
40   PAUSE
50   OUTPUT 2;"K";
60   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
70   OUTPUT 710;"RESET"
80   WAIT 1
90   OUTPUT 710;"SETUP ";S;".1,0"
100  FOR X=0 TO 1
110  IF X=0 THEN Y=1
120  IF X=1 THEN Y=0
130  OUTPUT 710;"WRITE ";S;".";X;",85"
140  OUTPUT 710;"READ ";S;".";Y
150  ENTER 710;A
160  B=BINEOR(A,85)
170  IF B=0 THEN GOTO 200
180  PRINT "FAILED PORT ";X;", WRITE 01010101. DATA IS: ";B
190  GOTO 210
200  PRINT "PASSED PORT ";X;", WRITE 01010101"
210  OUTPUT 710;"WRITE ";S;".";X;",170"
220  OUTPUT 710;"READ ";S;".";Y
230  ENTER 710;A
240  B=BINEOR(A,170)
250  IF B=0 THEN GOTO 290
260  PRINT "FAILED PORT ";X;", WRITE 10101010. DATA IS: ";B
270  BEEP 1500,.5
280  GOTO 300
290  PRINT "PASSED PORT ";X;", WRITE 10101010"
300  NEXT X
310  PRINT ""
320  PRINT "CONNECT DC VOLTMETER (-) LEAD TO GROUND #1"
330  PRINT "CONNECT DC VOLTMETER (+) LEAD TO PCTL"
340  FOR X=0 TO 1
350  OUTPUT 710;"RESET"
360  WAIT 1
370  Id$="I/O"
380  IF X=0 THEN Id$="PCTL"
390  IF X=1 THEN PRINT "CONNECT DC VOLTMETER (+) LEAD TO I/O"
400  INPUT "ENTER VOLTMETER READING",A
410  IF A>2.4 THEN 450
420  PRINT "FAILED "&Id$&" HIGH LEVEL TEST"
430  BEEP 1500,.5
440  GOTO 460
450  PRINT "PASSED "&Id$&" HIGH LEVEL TEST"
460  OUTPUT 710;"SETUP ";S;".5,10"
```

**Table 4.3 -1250-14 Digital Input/Output Module Test Program (Cont'd)**

```
470  INPUT "ENTER VOLTMETER READING",A
480  IF A<.8 THEN 520
490  PRINT "FAILED "&Id$&" LOW LEVEL TEST"
500  BEEP 1500,.5
510  GOTO 530
520  PRINT "PASSED "&Id$&" LOW LEVEL TEST"
530  NEXT X
540  PRINT "1.) CONNECT PCTL TO PFLG"
550  PRINT "2.) CONNECT DC VOLTMETER (+) LEAD TO LO"
560  INPUT "ENTER VOLTMETER READING",A
570  IF A>2 THEN 600
580  PRINT "FAILED PFLG TEST"
590  BEEP 1500,.5
600  OUTPUT 710;"SETUP ";S;".5,16"
610  OUTPUT 710;"WRITE ";S;".2,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0,-1,0"
620  INPUT "ENTER VOLMETER READING",A
630  IF A<.8 THEN 670
640  PRINT "FAILED PFLG TEST "
650  BEEP 1500,.5
660  GOTO 680
670  PRINT "PASSED PFLG TEST"
680  PRINT "DONE"
690  END
```

### 4.4.6 1250-40 Signal Matrix Module Test

4.4.6.1 The 1250-40 Signal Matrix module consists of 20 double-pole, single-throw relays arranged in a 4 row x 5 column channel switching matrix. As shown in Figure 4.5, each channel has a low and a high line which are switched simultaneously. The test fixture (see Figure 4.2) consists of the following:

a. Connection between all low line inputs

b. Connection between all high line inputs

c. Connection between all low line outputs

d. Connection between all high line outputs

4.4.6.2 With the test fixture installed and an ohmmeter connected between rows and columns, test the module by successively closing each channel while monitoring the ohmmeter for an indication of relay closure.

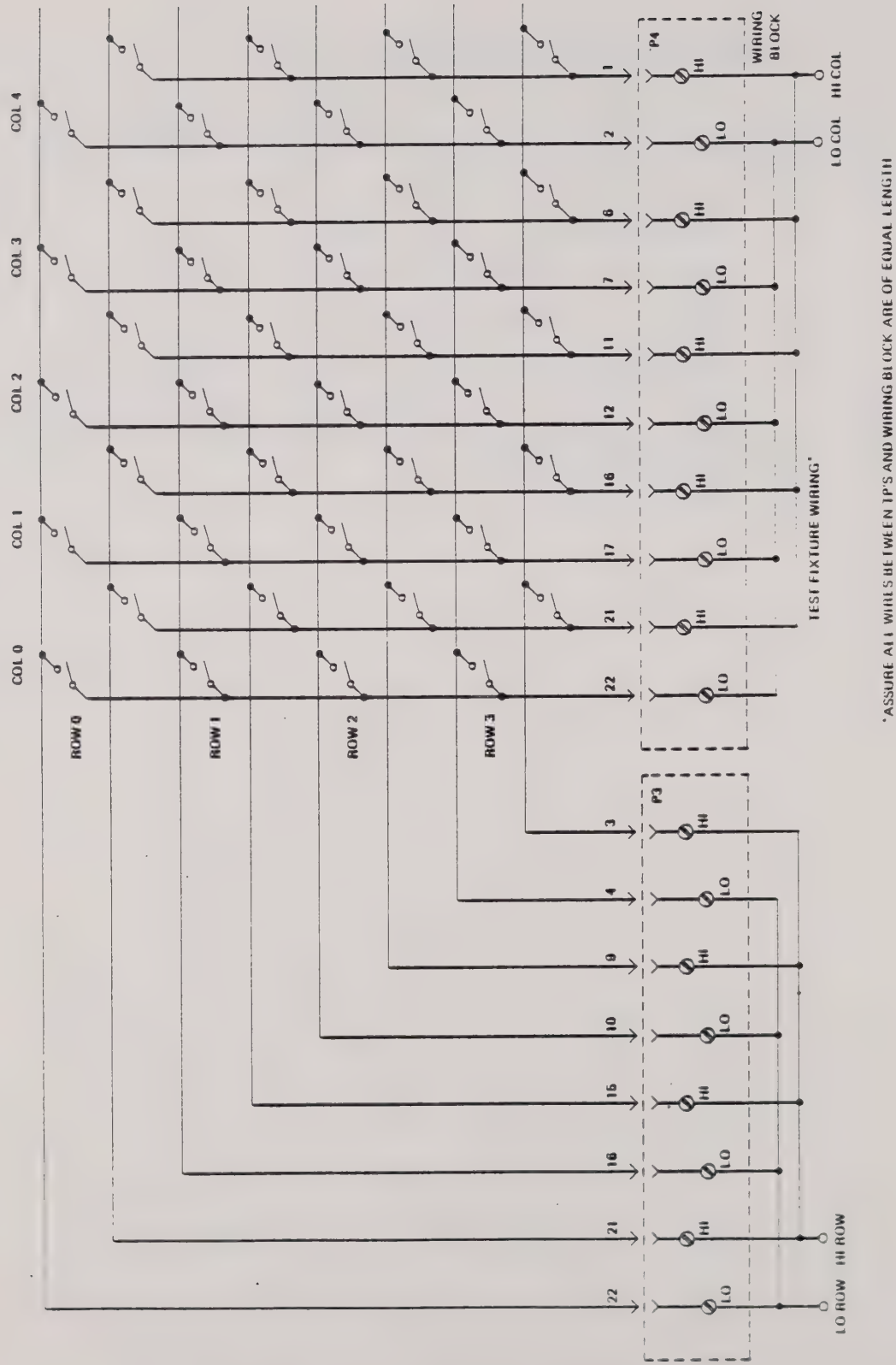



Figure 4.2 - 1250-40 Test Configuration

#### 4.4.6.3 Test Procedure

1. Install the test fixture onto the 1250-40's rear edge connector
2. Enter the test program listed in Table 4.4 into the controller
3. Execute the test program and follow all displayed prompts

## Table 4.4 - 1250-40 Signal Matrix Module Test Program

```
10 !  1250-40 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,M,S,Z,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.3
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI ROW AND HI COL."
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO ROW AND LO COL."
170   PAUSE
180   OUTPUT 2;"K";
190   FOR M=0 TO 3
200   FOR Y=0 TO 4
210   Z=M*100+Y
220   OUTPUT 710;"CL "&VAL$(S)&","&VAL$(Z)
230   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
240   OUTPUT 2;"K";
250   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
260   OUTPUT 710;"OP "&VAL$(S)&","&VAL$(Z)
270   IF Spec-Res>=0 THEN GOTO 320
280   IF X=1 THEN PRINT "H-ROW "&VAL$(M)&" TO H-COL. "&VAL$(Y)&Rep$&F$
290   IF X=2 THEN PRINT "L-ROW "&VAL$(M)&" TO L-COL. "&VAL$(Y)&Rep$&F$
300   BEEP 1500,1
310   GOTO 340
320   IF X=1 THEN PRINT "H-ROW "&VAL$(M)&" TO H-COL "&VAL$(Y)&Rep$&P$
330   IF X=2 THEN PRINT "L-ROW "&VAL$(M)&" TO L-COL "&VAL$(Y)&Rep$&P$
340   NEXT Y
350   NEXT M
360   NEXT X
370   PRINT "TEST COMPLETE"
380   END
```

### 4.4.7 1250-60/1250-61 18/26.5 GHz Microwave Switching M dule Tests

4.4.7.1 The 1250-60A/61A consist of two single-pole, doub -throw (SP T) relays forming two channel groups. Each channel group consists of thr terminals esignated as normally-open (NO), normally-closed (NC), and a correspondin common (C )M). The 1250-60B/61B consist of four SPDT relays forming four channel g ups identic to those of the 1250-60A/61A, respectively. Each module is tested by c necting an hmmeter between each channel group's COM and corresponding NO term nals. The nannel is closed and the ohmmeter is monitored for an indication of relay c osure. Only he signal line of the channel group is switched; the signal return line of eac group is co nected to each of the three group terminals. No special test fixture is requi ed.

4.4.7.2 **Test Procedure**

1. Enter the test program listed in Table 4.5 into t e controller

**NOTE:**

Shown is the test program for the 1250-60A/6 3. The program for the 1250-61A/61B is identical except or using the specific module option number whenever require

2. Execute the test program and follow all display prompts

## Table 4.5 – 1250-60/1250-61 18/26.5 GHz Microwave Switching Module Test Program

```
10 !  1250-60A/60B PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    COM A,K,S,Spec,Res
30    COM F$[30],Rep$[60],K$[1]
40    F$="    "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="    PASSED"
60    Spec=.5
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   INPUT "TEST OPTION 60B? Y OR N",K$
140   K=1
150   IF K$="Y" THEN K=3
160   OUTPUT 710;"RESET"
170   WAIT 2
180   FOR X=0 TO K
190   PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL COM "&VAL$(X)
200   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL N/C "&VAL$(X)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   IF Spec-Res)=0 THEN GOTO 280
250   PRINT "COM "&VAL$(X)&" TO N/C "&VAL$(X)&Rep$&F$
260   BEEP 1500,1
270   GOTO 290
280   PRINT "COM "&VAL$(X)&" TO N/C "&VAL$(X)&Rep$&P$
290   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X)
300   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL N/O "&VAL$(X)
310   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
320   OUTPUT 2;"K";
330   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
340   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X)
350   IF Spec-Res)=0 THEN GOTO 390
360   IF X<20 THEN PRINT "COM "&VAL$(X)&" TO N/O "&VAL$(X)&Rep$&F$
370   BEEP 1500,1
380   GOTO 400
390   IF X<20 THEN PRINT "COM "&VAL$(X)&" TO N/O "&VAL$(X)&Rep$&P$
400   PRINT ""
410   NEXT X
420   PRINT "TEST COMPLETE"
430   END
```

### 4.4.8 Low Frequency Relay Module Tests

4.4.8.1 This subsection provides PVPs for the following four low-frequency relay modules: 1250-12, 1250-15, 1250-20, and 1250-30.

### 4.4.8.2 1250-12 Relay Actuator Module Test

4.4.8.2.1 The 1250-12 Relay Actuator module contains a 10-channel array of double-pole single-throw (DPST) relays. The required test fixture (see Figure 4.3) connects all high inputs together, all low inputs together, all high outputs together, and all low outputs together. By connecting an ohmmeter between the connected inputs and corresponding connected outputs, the module is tested by successively closing each channel while monitoring the ohmmeter for an indication of relay closure.

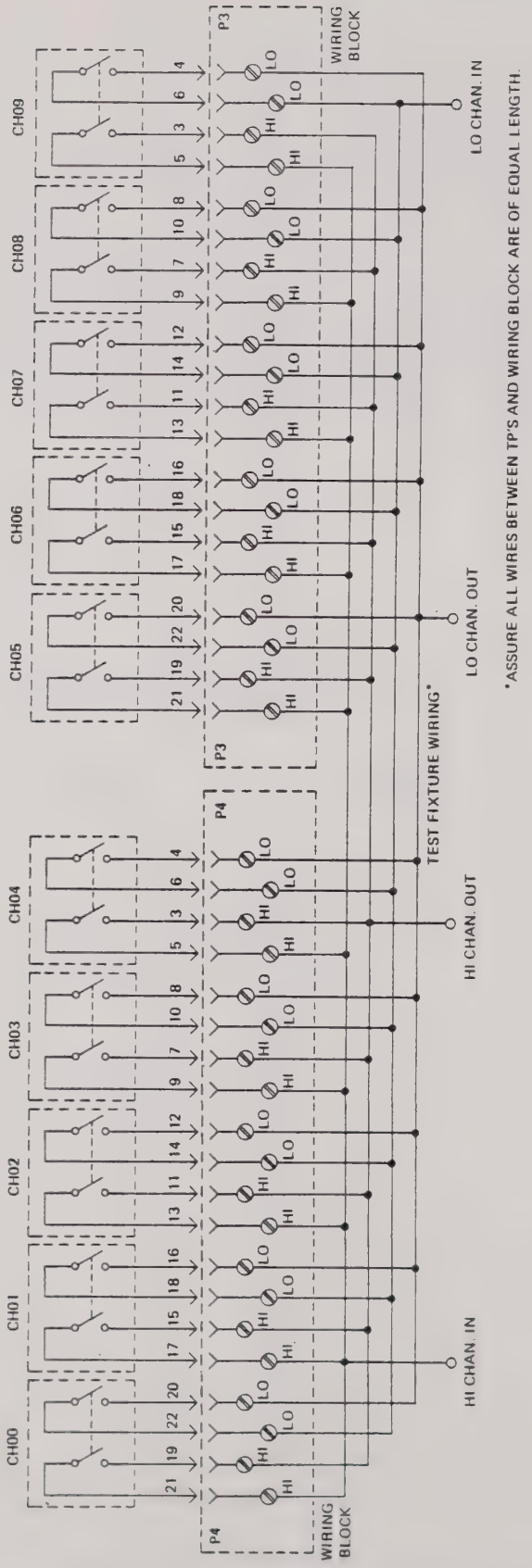



**Figure 4.3 - 1250-12 Test Configuration**

#### 4.4.8.2.2 Test Procedure

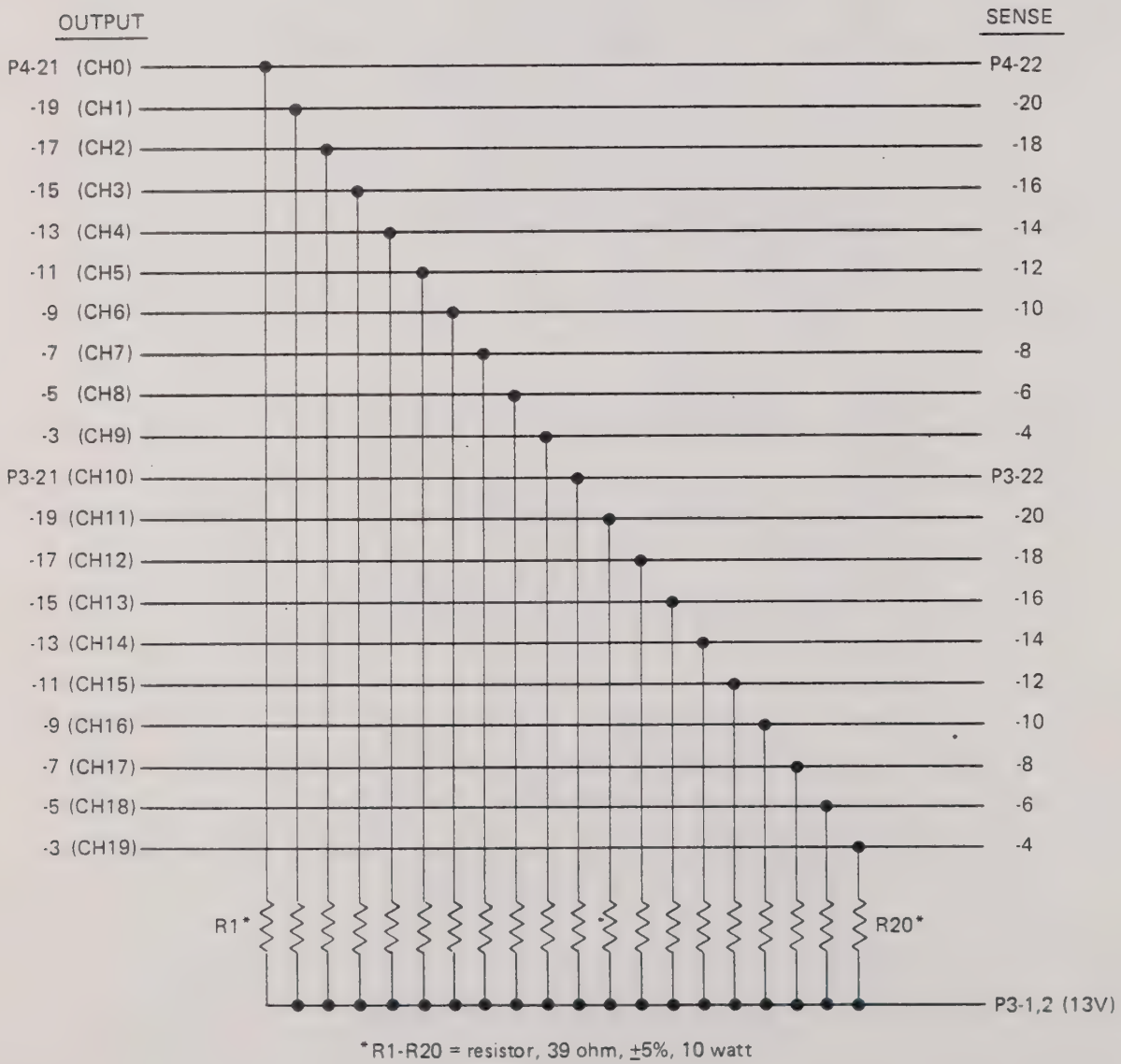
1. Remove the wiring block from the 1250-12's rear edge connector
2. Install the test fixture onto the 1250-12's rear edge connector
3. Set the multimeter to measure ohms. Connect and short P4 pins 19 and 21 of the 1250-12 assembly together using the shortest possible wire length. Connect the ohmmeter across TP1 and TP2 and zero the ohmmeter
4. Remove the short between pins 19 and 21 of P4
5. Enter the test program listed in Table 4.6 into the controller
6. Execute the test program and follow all displayed prompts

**Table 4.6 - 1250-12 Relay Actuator Module Test Program**

```
10 ! 1250-12 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20   COM A,S,Spec,Res
30   COM F$[30],Rep$[60]
40   F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50   P$="   PASSED"
60   Spec=.2
70   PRINT "1). SET 1250 ADDRESS TO 10."
80   PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90   PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100  PAUSE
110  OUTPUT 2;"K";
120  INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130  OUTPUT 710;"RESET"
140  FOR X=1 TO 2
150  IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI CHAN. IN AND HI CHAN. OUT"
160  IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO CHAN. IN AND LO CHAN. OUT"
170  PAUSE
180  OUTPUT 2;"K";
190  FOR Y=0 TO 9
200  OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Y)
210  INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220  OUTPUT 2;"K";
230  Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240  OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Y)
250  IF Spec-Res>=0 THEN GOTO 300
260  IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&F$
270  IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT."&VAL$(Y)&Rep$&F$
280  BEEP 1500,1
290  GOTO 320
300  IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&P$
310  IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&P$
320  NEXT Y
330  NEXT X
340  PRINT "TEST COMPLETE"
350  END
```

### 4.4.8.3 1250-15 Relay Driver Module Test

4.4.8.3.1 The 1250-15 Relay Driver module consists of 20 drive lines capable of sinking up to 350 mA of current and 20 corresponding readback lines. The test for this module consists of connecting each drive line to its corresponding readback line and pulling the two lines up through a 39-ohm, 10-watt resistor to the 13-volt line. See Figure 4.4 for a schematic view of the 1250-15 test fixture. Each drive line should be actuated and the corresponding readback line interrogated to ensure that the line assumed a low logic level.




*R1-R20 = resistor, 39 ohm, ±5%, 10 watt

**Figure 4.4 - 1250-15 Test Configuration**

#### 4.4.8.3.2 Test Procedure

1. Install the test fixture onto the 1250-15's rear edge connector
2. Enter the test program listed in Table 4.7 into the controller
3. Execute the test program and follow the displayed prompts

**Table 4.7 - 1250-15 Relay Driver Module Test Program**

```
10 !  1250-15 PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    PRINT "1. SET 1250 ADDRESS TO 10."
30    PRINT "2. CONNECT TEST FIXTURE TO THE 1250-15."
40    PAUSE
50    OUTPUT 2;"K";
60    INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
70    OUTPUT 710;"CNF ON"
80    FOR X=0 TO 19
90    OUTPUT 710;"CL "&VAL$(S)&","&VAL$(X)
100   OUTPUT 710;"VERR"
110   ENTER 710;A$
120   IF A$[12,13]=VAL$(99) THEN P=1
130   IF A$[12,13]=VAL$(51) THEN P=0
140   WAIT .5
150   OUTPUT 710;"OP "&VAL$(S)&","&VAL$(X)
160   OUTPUT 710;"VERR"
170   ENTER 710;A$
180   IF A$[12,13]=VAL$(99) AND P=1 THEN PRINT "CHANNEL "&VAL$(X)&"  PASSED"
190   IF A$[12,13]=VAL$(51) OR P=0 THEN GOSUB Fail
200   NEXT X
210   PRINT "DONE"
220   GOTO 270
230 Fail:  !
240   PRINT "CHANNEL "&VAL$(X)&"  "&CHR$(131)&"FAILED"&CHR$(128)
250   BEEP 1500,.1
260   RETURN
270   END
```

### 4.4.8.4 1250-20 Relay Power Module Test

4.4.8.4.1 The 1250-20 Relay Power module consist of a 10-channel array of double-pole, single-throw (DPST) relays. The required test fixture (see Figure 4.5) connects all high inputs together, all low inputs together, all high outputs together, and all low outputs together. By connecting an ohmmeter between the connected inputs and corresponding connected outputs, the module is tested by successively closing each channel while monitoring the ohmmeter for an indication of relay closure.

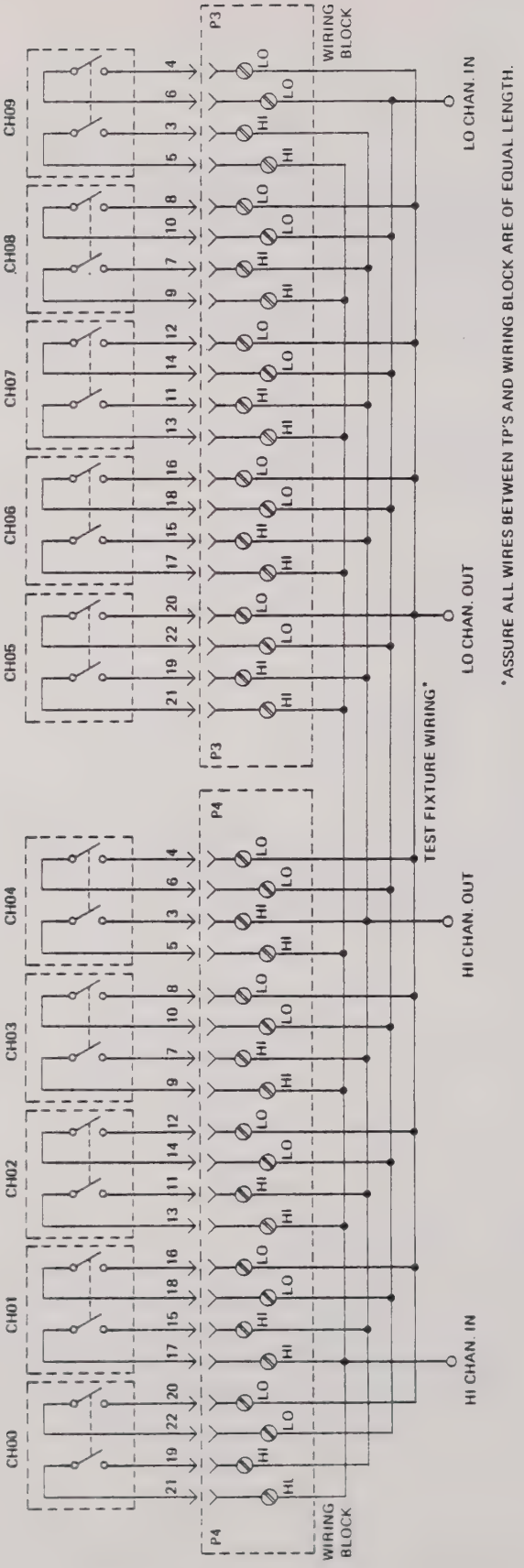





**Figure 4.5 - 1250-20 Test Configuration**

#### 4.4.8.4.2 Test Procedure

1. Install the test fixture onto the 1250-20's rear edge connector
2. Enter the test program listed in Table 4.8 into the controller
3. Execute the test program and follow the displayed prompts

**Table 4.8 - 1250-20 Power Relay Module Test Program**

```
10 !  1250-20 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,S,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.15
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI CHAN. IN AND HI CHAN. OUT"
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO CHAN. IN AND LO CHAN. OUT"
170   PAUSE
180   OUTPUT 2;"K";
190   FOR Y=0 TO 9
200   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Y)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Y)
250   IF Spec-Res)=0 THEN GOTO 300
260   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&F$
270   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&F$
280   BEEP 1500,1 "
290   GOTO 320
300   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&P$
310   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&P$
320   NEXT Y
330   NEXT X
340   PRINT "TEST COMPLETE"
350   END
```

### 4.4.8.5 1250-30 Scanner/Multiplexer Module Test

4.4.8.5.1 The 1250-30 is a 20-channel scanner/multiplexer consisting of a 20-channel array of double-pole, single-throw (DPST) relays. Each relay channel has a low line and a high line which are simultaneously switched. The required test fixture (see Figure 4.6) consists of:

a. Connection between all low lines (channels 0-19)

b. Connection between all high lines (channels 0-19)

c. Connection of high common 1 and 2

d. Connection of low common 1 and 2

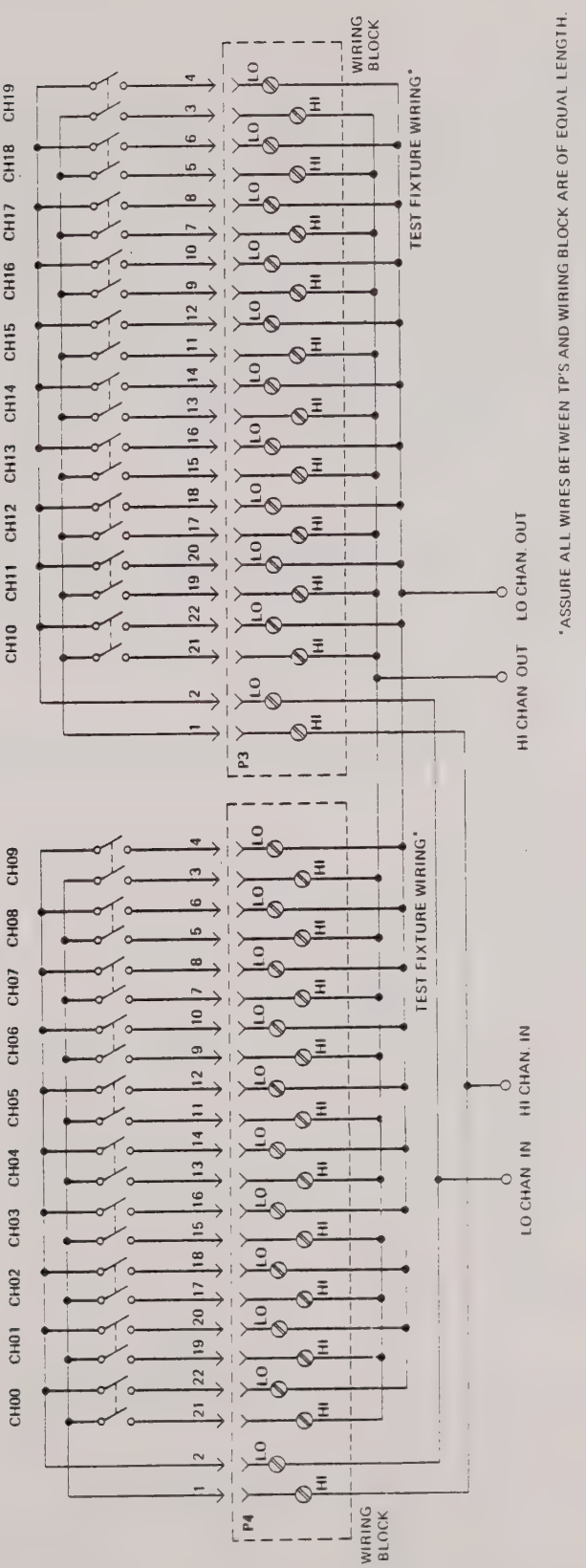



**Figure 4.6 - 1250-30 Test Configuration**

#### 4.4.8.5.2 Test Procedure

1. Install the test fixture onto the 1250-30's rear edge connector
2. Enter the test program listed in Table 4.9 into the controller
3. Execute the test program and follow all displayed prompts

**Table 4.9 - 1250-30 Scanner/Multiplexer Module Test Program**

```
10 !  1250-30 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20    COM A,S,Spec,Res
30    COM F$[30],Rep$[60]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.3
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   OUTPUT 710;"RESET"
140   FOR X=1 TO 2
150   IF X=1 THEN PRINT "CONNECT OHMMETER BETWEEN HI CHAN. IN AND HI CHAN. OUT"
160   IF X=2 THEN PRINT "CONNECT OHMMETER BETWEEN LO CHAN. IN AND LO CHAN. OUT"
170   PAUSE
180   OUTPUT 2;"K";
190   FOR Y=0 TO 19
200   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(Y)
210   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
220   OUTPUT 2;"K";
230   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
240   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(Y)
250   IF Spec-Res)=0 THEN GOTO 300
260   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&F$
270   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&F$
280   BEEP 1500,1
290   GOTO 320
300   IF X=1 THEN PRINT "H-CH IN "&VAL$(Y)&" TO H-CH OUT "&VAL$(Y)&Rep$&P$
310   IF X=2 THEN PRINT "L-CH IN "&VAL$(Y)&" TO L-CH OUT "&VAL$(Y)&Rep$&P$
320   NEXT Y
330   NEXT X
340   PRINT "TEST COMPLETE"
350   END
```

### 4.4.9 RF Relay Module Tests

4.4.9.1 This subsection provides PVPs for the following RF relay modules: 1250-50, 1250-51A/51B, 1250-52A/52B.

### 4.4.9.2 1250-50 200 MHz RF Switching Module Test

4.4.9.2.1 The 1250-50 200 MHz RF Switching module consists of 22 single-pole, single-throw (SPST) relays, grouped to form two arrays. Only the signal line of each channel is switched; the signal return lines of both groups' channels are connected together. The module is tested by connecting an ohmmeter to the center conductor of two channels, closing the corresponding channel relays, and monitoring the ohmmeter for an indication of relay closure. No special test fixture is required.

#### 4.4.9.2.2 Test Procedure

1. Enter the test program listed in Table 4.10 into the controller
2. Execute the test program and follow all displayed prompts

## Table 4.10 - 1250-50 200 MHz RF Switching Module Test Program

```
10 ! 1250-50 PERFORMANCE VERIFICATION TEST PROGRAM - 6/12/86 - MOOR
20   COM A,S,Spec,Res
30   COM F$[30],Rep$[60]
40   F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50   P$="   PASSED"
60   Spec=.5
70   PRINT "1). SET 1250 ADDRESS TO 10."
80   PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90   PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100  PAUSE
110  OUTPUT 2;"K";
120  INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130  OUTPUT 710;"RESET"
140  WAIT 2
150  OUTPUT 710;"CL "&VAL$(S)&".0,19,20,39"
160  FOR X=0 TO 30 STEP 10
170  IF X=0 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 00."
180  IF X=20 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 20."
190  FOR Y=0 TO 4
200  IF X+Y=0 OR X+Y=20 THEN GOTO 350
210  OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X+Y)
220  PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL "&VAL$(X+Y)
230  INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
240  OUTPUT 2;"K";
250  Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
260  OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X+Y)
270  IF Spec-Res)=0 THEN GOTO 320
280  IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&F$
290  IF X)=20 THEN PRINT "CHAN. 20  TO CHAN. "&VAL$(X+Y)&Rep$&F$
300  BEEP 1500,1
310  GOTO 340
320  IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&P$
330  IF X)=20 THEN PRINT "CHAN. 20 TO CHAN. "&VAL$(X+Y)&Rep$&P$
340  PRINT ""
350  NEXT Y
360  NEXT X
370  PRINT "TEST COMPLETE"
380  END
```

### 4.4.9.3 1250-51/1250-52 500 MHz/1 GHz RF Switching Module Tests

4.4.9.3.1 The 1250-51A/52A consist of either 12 double-pole, double-throw (DPDT) relays arranged to form two connecting 5-channel arrays (-51A) or arranged as two 4:1 multiplexers (-52A). The 1250-51B/52B consist of either 24 DPDT relays arranged as two groups of two connecting 5-channel arrays (-51B) or arranged as four 4:1 multiplexers (-52B). For the 1250-51A/51B, the module is tested by connecting an ohmmeter between two channels of a particular group, closing the corresponding relays while monitoring the ohmmeter for an indication of relay closure. For the 1250-52A/52B, the module is tested by connecting an ohmmeter between the COM terminal and each of the four channel terminals, closing the corresponding relays while monitoring the ohmmeter for an indication of relay closure. In all testing, only the signal path of each channel is switched; the signal return lines are connected together. Also, no special test fixture is required.

#### 4.4.9.3.2 Test Procedure

1. Enter the test program listed either Table 4.11 or 4.12 into the controller for the 1250-51/1250-52, respectively

2. Execute the test program and follow all displayed prompts

## Table 4.11 – 1250-51A/51B 500 MHz RF Switching Module Test Program

```
10 !  1250-51A/51B PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20    COM A,K,S,Spec,Res
30    COM F$[30],Rep$[60],K$[1]
40    F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50    P$="   PASSED"
60    Spec=.6
70    PRINT "1). SET 1250 ADDRESS TO 10."
80    PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90    PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100   PAUSE
110   OUTPUT 2;"K";
120   INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130   INPUT "TEST OPTION 51B? Y OR N",K$
140   K=10
150   IF K$="Y" THEN K=30
160   OUTPUT 710;"RESET"
170   WAIT 2
180   OUTPUT 710;"CL "&VAL$(S)&".0,19,20,39"
190   FOR X=0 TO K STEP 10
200   IF X=0 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 00."
210   IF X=20 THEN PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL 20."
220   FOR Y=0 TO 4
230   IF X+Y=0 OR X+Y=20 THEN GOTO 380
240   OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X+Y)
250   PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL "&VAL$(X+Y)
260   INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
270   OUTPUT 2;"K";
280   Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
290   OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X+Y)
300   IF Spec-Res)=0 THEN GOTO 350
310   IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&F$
320   IF X)=20 THEN PRINT "CHAN. 20  TO CHAN. "&VAL$(X+Y)&Rep$&F$
330   BEEP 1500,1
340   GOTO 370
350   IF X<20 THEN PRINT "CHAN. 0  TO CHAN. "&VAL$(X+Y)&Rep$&P$
360   IF X)=20 THEN PRINT "CHAN. 20 TO CHAN. "&VAL$(X+Y)&Rep$&P$
370   PRINT ""
380   NEXT Y
390   NEXT X
400   PRINT "TEST COMPLETE"
410   END
```

**Table 4.12 – 1250-52A/52B 1 GHz RF Switching Module Test Program**

```
10 ! 1250-52A/52B PERFORMANCE VERIFICATION TEST PROGRAM - 6/13/86 - MOOR
20   COM A,K,S,Spec,Res
30   COM F$[30],Rep$[60],K$[1]
40   F$="   "&CHR$(131)&"FAILED"&CHR$(128)
50   P$="   PASSED"
60   Spec=.5
70   PRINT "1). SET 1250 ADDRESS TO 10."
80   PRINT "2). CONNECT OHMMETER (4-WIRE) CONFIGURATION CABLES TOGETHER AT THE"
90   PRINT "    DISTAL END AND NULL OHMMETER OFFSET."
100  PAUSE
110  OUTPUT 2;"K";
120  INPUT "WHAT SLOT IS THE MODULE INSTALLED IN ?  1-5",S
130  INPUT "TEST OPTION 52B? Y OR N",K$
140  K=10
150  IF K$="Y" THEN K=30
160  OUTPUT 710;"RESET"
170  WAIT 2
180  FOR X=0 TO K STEP 10
190  PRINT "CONNECT OHMMETER INPUT HI TO CHANNEL COM "&VAL$(X/10)
200  FOR Y=0 TO 3
210  OUTPUT 710;"CL "&VAL$(S)&"."&VAL$(X+Y)
220  PRINT "CONNECT OHMMETER INPUT LO TO CHANNEL "&VAL$(X+Y)
230  INPUT "ENTER OHMMETER READING EXPRESSED IN OHMS",Res
240  OUTPUT 2;"K";
250  Rep$="  DATA: "&VAL$(Res)&"  SPEC: "&VAL$(Spec)&"  DELTA: "&VAL$(Spec-Res)
260  OUTPUT 710;"OP "&VAL$(S)&"."&VAL$(X+Y)
270  IF Spec-Res)=0 THEN GOTO 310
280  PRINT "COM "&VAL$(X/10)&" TO CHAN. "&VAL$(X+Y)&Rep$&F$
290  BEEP 1500,1
300  GOTO 320
310  PRINT "COM "&VAL$(X/10)&" TO CHAN. "&VAL$(X+Y)&Rep$&P$
320  PRINT ""
330  NEXT Y
340  NEXT X
350  PRINT "TEST COMPLETE"
360  END
```

### 4.4.10 1250-90 Intelligent Front Panel Option Test

4.4.10.1 The 1250-90 Intelligent Front Panel provides local programming capabilities and displays up to 16 alphanumeric characters. The module is tested by invoking internal keyboard and display test routines stored in the 1250 system memory.

#### 4.4.10.2 Test Procedure

1. Enter the following key sequence to invoke the display self-test:

   [TEST] [0] [.] [4] [EXEC]

   After placing the 1250 in the display self-test mode, the following characters will be displayed after pressing the 0 key (at a repetition rate of one second): (1) upper case "A-Z", (2) numerics "0-9", and (3) punctuation marks for hyphen, period, comma, semicolon, colon, and asterisk. Carefully inspect each character, ensuring that all characters are properly displayed

2. The front-panel display will then "walk" a single asterisk across the display, beginning with digit 0 and ending at digit 15 (left to right). The annunciators corresponding to the displayed digit will illuminate as follows:

| Digit | Annunciator |
|---|---|
| 0 | REM |
| 3 | ADDR |
| 6 | SRQ |
| 9 | SEL |
| 12 | ERROR |
| 15 | UPDATE |

   Carefully inspect every digit, ensuring that each is properly illuminated, as applicable, with its corresponding annunciator

3. Terminate the display self-test by pressing the [TEST] key

4. The keyboard can be tested by pressing key sequence [TEST] [0] [.] [5] [EXEC]. After completing this key sequence, press each key and verify that each is correctly identified on the display. This test will confirm keyboard recognition by the 1250 mainframe. Exit the test by pressing the [TEST] key a second time